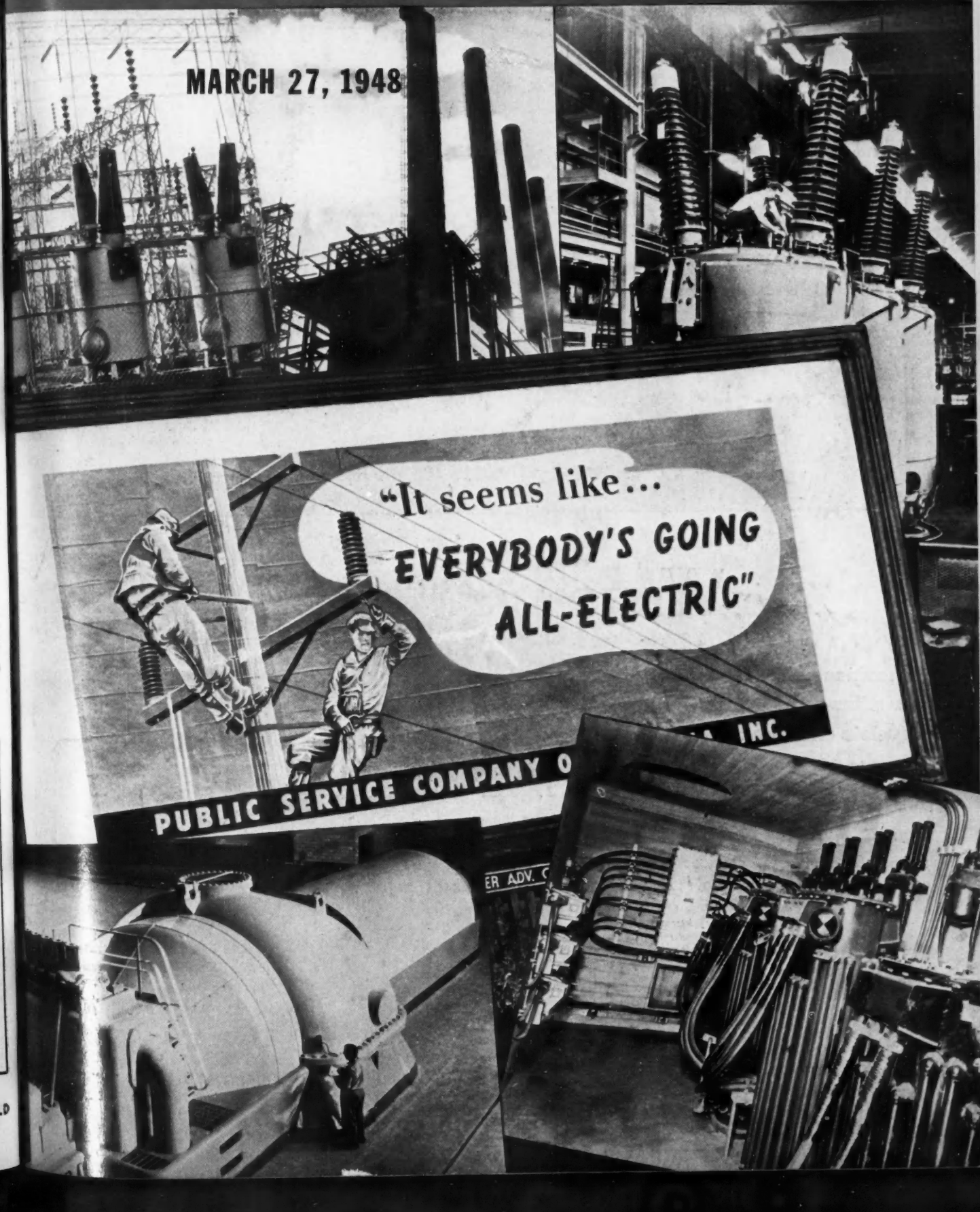
ELECTRICAL WORLD

A McGRAW-HILL PUBLICATION



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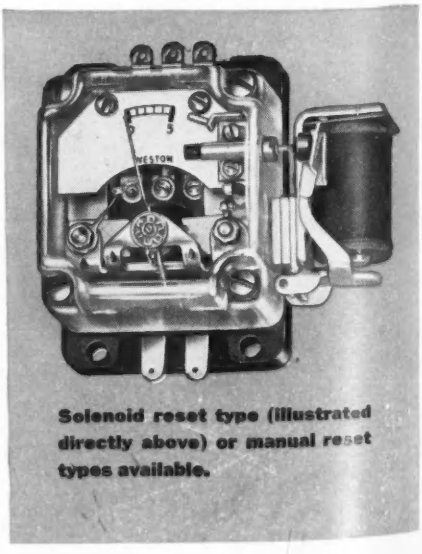

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MARCH 27, 1948

"No" on New Johnsonville

In Electrical World's last issue, an attempt was made to lay out the basic facts on the Tennessee Valley Authority's proposal to build a steam-electric plant at New Johnsonville, Tenn. Now, the time has come for interested parties to be counted on the New Johnsonville issue.

Electrical World opposes New Johnsonville. There are a number of reasons for this stand. Not all of them can be set forth at once. But, just for a starter, here's one reason:

We think New Johnsonville represents a new and even more improper step for TVA. Despite the existence of Watts Bar and the acquired thermal-electric properties, we see New Johnsonville as something new in the TVA pattern. It goes far beyond the concept that, even under a private enterprise economy, government should use the water power it inevitably creates when it controls floods or improves navigation. We always have felt that concept wrong to the extent that it lets public enterprise, not private, do the power job.

Yet at New Johnsonville, government is not just using an inevitable natural resource. It is undertaking a proprietary function which it has the legal, but we believe not the moral, right to undertake.

Without attempting here to argue "yardsticks," or subsidies, the fact remains that TVA is required by law to pay almost no interest and, relatively, almost no taxes. Under any such circumstances, TVA can undersell commercial competitors. We think it's wrong for government so to compete, using even the inevitable by-product natural resources of a flood control-navigation development. We think it a cynical compounding of the wrong for government to do so with the aid of thermal plants which are in no sense a natural resource, nor even inevitable.

One of the chief reasons we think steam-electric operations are extra-wrong is that they constitute an unnecessary going-out-of-the-way by government to help people who don't need help. Last (fiscal) year, 48 percent of TVA's output went to industrials. Another 34 percent went to municipal and county systems. With the inevitable, by-product natural resource power about gone, why must the U.S. Treasury be the source of capital for more non-natural-resource-power? Why must the U.S. tax-payer buy the facilities which industries and municipals in this area can supply for themselves? Isn't this, in effect, discriminatory subsidy?

Ultimately, any growing hydro system will need thermal-electric help, of course. But when the natural "gravy" implicit in development of the Tennessee has been used up, why must more be ladled out to the favored few? Lansing, Kansas City and many more municipalities have their own systems without federal capital. Ford and Carnegie-Illinois are comparable industrials. If these systems can do their jobs without federal capital, why must Knoxville, Memphis, Monsanto and Victor Chemical get preference beyond the inevitable by-product supply?

Coming: Railroad Electrification?

A LOT OF CHANGES have been made in the old concepts governing railroad electrification. Chief among them is the economics of fuels. Another is the vast investment which multiple diesels require. A third is the relative maintenance costs of electric motive power versus steam or diesel. The decision of earlier years against rail electrification—except under very specific conditions—may not yet have been reversed. But how it's been opened to re-examination!

There's another new concept, too, which merits study. South Africa, Britain, Italy and Brazil all have plumped for extensive rail electrification. Granted that each has a real fuel-stringency incentive. But they have an approach as yet unknown here. They see rail electrification as but one facet of area electrification. With them, it is no isolated question. Instead, transportation is a major national economic issue—like agriculture or industry. This smacks of state planning, true. But of itself, planning is not necessarily bad, nor need it automatically be state planning.

Under such a concept as this, railroads would not have to enter the power business to achieve electrification. And this fact might help reverse the traditional U. S. decision against rail electrification. For the power industry, area electrification ought to be an enticing prospect. It's business is to sell power. Then how better to do business than to sell all the power that can be sold—to anyone who wants to, or needs to, or ought to buy power?

Today, not Tomorrow

BUILDING, in the electric utility industry, is of two kinds—capacity and load. They complement each other. In fact, each is the reason for the other.

A power plant cannot be improvised. It cannot be put together right at the time of need for it, with whatever materials and apparatus that happen to be at hand.

Load cannot be improvised either. No more than a power plant, can the structure of load be safely left for determination by whatever may be on hand at the time of need.

Right now the industry is feverishly building capacity —generating plants, substations, transmission, and distribution, trying to catch up with demand. So occupied is the industry with the urgencies of this task that the other kind of building does not get the consideration it should have.

Just as the building of capacity must be planned ahead in minute detail, so also should load building be planned ahead. Just as purpose and design of physical plant are defined by study and analysis, so should structure of load be put together in knowledge of size, shape and nature of its components. Just as the construction of plant is programmed with men, money and material assigned in definite schedule, so should the building of load.

Planning in advance of building, whether of plant or of load, takes time. If, beginning now, time is not taken to plan and build load, the finished structure will not be ready when the need for it arrives. And the need will arrive. There is no safety in the assumption that load will just naturally be waiting when the new power plants and other facilities now building go into operation. Even if load is waiting, the assumption is still unsafe; load building still is necessary. It is necessary to assure that the waiting load is of such kind and character as will be favorable to adequate return on the heavy new investment.

"We are figuring on earning a return on that additional investment," says R. A. Gallagher, president of the Indiana Public Service Co, in one of the articles in a series on load building in this issue. Other articles discuss recruitment and training of sales personnel, methods to enlist dealer cooperation, organization for adequate wiring promotion, and selling of planned lighting, electric cooking and water heating—just a few of the many activities that make up the whole picture of load building.

Knitting these things into a coherent plan for a load structure to fit the conditions of the specific utility will require time. No one can tell how much time will be available. This being so, it is only common sense that the job be started today, not tomorrow.

See Your Banker Twice a Year

A SMALL GROUP of utility executives was addressed recently by representatives of five different parts of the investment banking industry. The institutional buyer told his story, and so did the security analyst, the commercial banker, the investment banker and the investor service man. With understandable differences on specific points, they gave opinions which were generally consistent.

But on one point, all agreed completely. Each urged utility executives to cultivate banks, insurance companies, investment bankers, security analysts, rating services and other important parts of the investment community. Each made two points in particular.

First, they urged that utility executives keep themselves informed, through such contacts, with what's going on in the financial world.

Second, they emphasized the desirability of keeping the financial world fully and intimately acquainted with what's going on within individual utility systems.

Even after allowing for the understandable impulse of these investment men to use such an occasion to sell their wares, their advice sounds good. Electric power systems have a lot of money to raise. It will have to come from a seller's market. Those companies which know the market well—and are well known to it—seem likely to face an easier financing job. And who is it today whose financing is as easy as it needs to be?

NEWS OF THE ELECTRICAL WORLD

The Electrical Week

The news was heavy, this week, in and out of Washington. At the capital, Ed Falck took over the war-power-planning job . . . A Congressional committee debated a no-strike formula for atomic energy which could affect power systems and electrical manufacturers . . . And Congress had before it legislation which might impinge on FPC's licensing functions for projects on navigable streams . . . Away from Washington, California's power rationing program was organized further . . . In Wisconsin, the state anti-utility-strike law was junked by Judge Alvin Reis . . . And in Arkansas, a rate order by the state commission came under unexpected attack by the Arkansas-Missouri Power Co.

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Don't shudder when you read the Sumner Pike story on atomic power plants a few pages hence. That 1,000 to 1,500 deg figure he mentions really IS Centigrade. It's not just a typographical error. Pike's complete quote: "Levels of about 1,000 to 1,500 deg Centigrade seem to be about the range to shoot for."

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Note from a field trip report: "Shortage of experienced construction men is marked. Labor rates are high, work plentiful. So men are short-tempered and independent. They walk off jobs at the drop of a hat. Someone is always dropping hats."

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Nine Illinois municipals have organized to exchange storm and disaster assistance. Most of the rest are expected to join soon.

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It Takes All Kinds Dept: Last week in Washington, the small talk was almost all war. At NEMA's Chicago meeting, the small talk was largely shop talk.

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Widespread use of residential heat pumps can be looked for by 1950. That's the feeling of Ernest Gygax, chief engineer for General Engineering and Manufacturing Co, St. Louis. He sees rising costs of conventional fuels as the chief reason.

February employment dropped in manufacturing industries, but BLS estimates that wage and salary workers in the electric light and power industry rose 3,000 above January's 268,000. February employment was 19,000 above that a year ago.

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Public utility construction in the first two months of the year was 23 percent above the comparable period in 1947. In February 1948, it was off two percent from January's total of $100,000,000.

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Somebody counted 148 tools and 144 different materials on a line truck. If they keep this up, they'll start giving women's pocketbooks a little competition.

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Independent agents selling for the independent manufacturers are ready to announce formation of an Electrical Equipment Representatives Association. Invitations are to go to all who have been in the business five years, have two or more accounts and maintain a real office.

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CIO President Phil Murray has moved to recognize the right-wing faction in UE-CIO. He wrote UE leaders Albert Fitzgerald and Julius Emspak, both recently resigned from the CIO-PAC executive board, asking whether they might be replaced with pro-PAC UE members. PAC opposes Henry Wallace. Fitzgerald heads Wallace's labor committee.

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Westinghouse has a scheme for making oscillograms with as many as seven traces in color. It's simple enough for utilities to duplicate, using Ansco amateur-type color film. Another device from the same laboratory automatically imposes cross-line reference markings exactly one second apart on oscillograms. A third, as yet strictly a test trick, permits opening of a breaker at any desired point on a 60-cycle wave.

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Dogged persistence finally located gas leaks in London's early high-voltage cable-in-pipe system. A Labrador hound and a stench bomb did what more scientific detection schemes couldn't do.

Falck Now NSRB Power Consultant; Steel, Fuel, ERB Major Problems

THE CIVILIAN POWER organization for a new war began to take shape this week —and it starts off with all the earmarks of its highly-successful predecessor, Office of War Utilities, WPB.

Edward Falck, former OWU director, has become chief consultant on electric power, gas, and water matters for the National Security Resources Board. It is under NSRB that non-military planning for the next war centers.

Falck told ELECTRICAL WORLD this week that a Power and Utilities Division exists today on paper. But he added that the question of whether it should be staffed now is as yet undecided. It was indicated that considerable discussion of the problems facing NSRB on power, gas, and water will be held before any decision to staff today's "paper" agency will be made.

Falck made it plain that key personnel of OWU would be consulted before NSRB's Power and Utilities Division evolves much farther. He said such consultation would be with two groups. On power matters, one is the former OWU division and section chiefs, such men as B. J. Sickler of Bonneville, V. M. Marquis of American Gas, W. A. Lyons of New York State Electric & Gas C. G. Davidson of the Interior Department, and others. The second group, he said, would include the top industry people who were primarily non-operating advisors to OWU between 1941 and 1945. These would include such executives as Philip Sporn of American Gas & Electric, James Parker of Detroit Edison, and K. M. Irwin of Philadelphia Electric.

Falck anticipated that conversations with such groups would begin next month. A possibility that some of them may be called earlier arises from the coal strike. But any such consultation on the strike—of a type which has been engaged in by this group since the war's end—would be aside from the ordinary nature of NSRB's responsibility.

Over and above the administrative problem these men will have to help decide—that of whether to have "paper" office or one fully staffed—three other major problems appear. While their urgency has not been completely established, they are these:

The steel shortage, ERP procurement, and fuel.

Significance of the fuel problem is apparent, and it touches the gas portion of the NSRB problem as fully as it does power. With regard to the steel shortage and ERP procurement, the problem is to insure that neither affects the long-range expansion program the power industry now has in full swing. Falck pointed to the national defense aspects of facilities scheduled by the power industry for installation between today and 1952. He asserted that a major activity for NSRB's Power and Utilities Division might well be that of keeping such installations on schedule, unencumbered by either the steel shortage or ERP procurement.

Undoubtedly, the same problem would face the division on gas supply, as well.

NSRB was organized last year under the act which aimed at unifying the Armed Forces. Essentially, its assignment is to do the non-military planning for the next war. Its military counterpart is the Munitions Board, whose power consultant was recently announced as Mark Eldredge, another former OWU staff member.

It will be NSRB's function to inform industry as to the probable war demands upon it and to estimate industry's ability to meet them. It may either urge voluntary action or recommend legislation to achieve industrial preparedness. Undecided as yet, but of major importance to NSRB's future activity, is the policy question of how far NSRB should go on matters which have security implications but are not directly its function. A number of such issues which would affect the power industry can be imagined without difficulty.

CANADIAN AND AMERICAN electrical manufacturing association leaders who took part in NEMA's winter convention, last week, at Chicago. Left to right: A. S. McCordick, president, Canadian Electrical Manufacturers Association; William C. Johnson, president, NEMA; Carl Taylor, president, Waukesha (Wis.) State Bank, a convention speaker; B. N. Simpson, general manager, CEMA; and W. J. Donald, managing director, NEMA.

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Truman Invokes Taft Act to Halt Mine Shutdown

With the United States facing a coal mine shutdown of at least three weeks—and no one can guess how much longer —President Truman invoked the Taft-Hartley law this week against John L. Lewis.

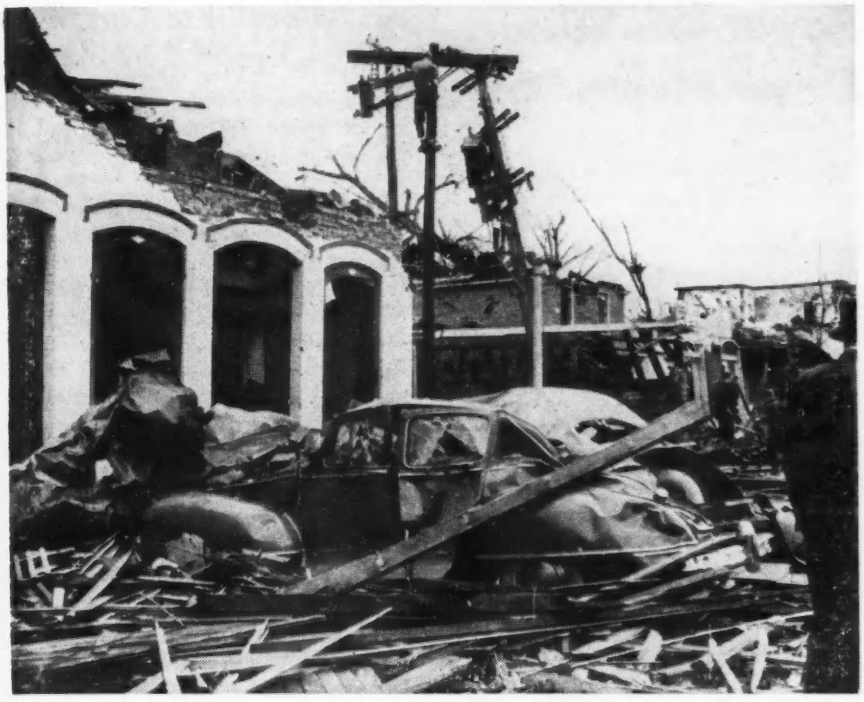
Truman appointed a three-man inquiry board and gave it until April 5 to report as to the issue in dispute. This is the failure of Lewis, Ezra Van Horn, representing the mine operators, and an impartial trustee to agree on the details of a pension plan. One was provided for in the July 8 agreement signed last year by the United Mine Workers and the operators.

An injunction against the work stoppage by 350,000 miners can be sought by the Attorney-General after receipt of the board's report. If effective, it would restore production for a maximum of 80 days. But there was no assurance in Washington that the men would go back without a signal from Lewis.

Even so, there remains the possibility of another strike in July when the present agreement ends. Lewis can terminate it sooner by giving a 30-day notice.

Figures on coal stocks held by electric utilities when the strike began Mar. 15 are not available, but the U. S. Bureau of Mines reports that the industry had an average of 56 days' supply on Feb 1. (FPC showed 62 days' supply for power utilities Feb 1.)

Two disagreements are Lewis' insistence that the pension go to retired miners and that it also apply to all union members, including those working for operators not parties to the national agreement and who have not contributed to the fund. This would violate the Taft-Hartley Act. It requires that a fund to which an employer contributes must be for the sole benefit of his employees and their families.



AMONG THE WRECKAGE at Bunker Hill, Ill., lineman of the Illinois Power Co works to restore service. The town was destroyed last week by a tornado

Strike Threat at Oak Ridge Spurs Congress to Tighten Taft-Hartley Act

THE UNHAPPY POSSIBILITY of a legal, government-assisted strike by the AFL at the Oak Ridge National Laboratory next June 7 has Congress worried. It is seeking a plug for a hole in the Taft-Hartley law that permits an atomic strike—or any other "national emergency" strike—80 days after an injunction begins.

Already at work on the problem is the Joint Committee on Atomic Energy. Pushing them is the need for atomic bomb production and the two strike threats which have hit Oak Ridge. From testimony at five hearings, it appears the Committee will consider two related steps:

1. Prohibiting strikes affecting atomic bomb output.

2. Establishing some standards for working conditions and welfare benefits and providing the means of fair determination of wages and other terms.

Application of a "no-strike-no-lockout" plan in this vital industry may also test how it might work elsewhere—in electric power for instance.

Actually, some power systems and electrical manufacturers may be affected by any government plan conceived to handle labor problems affecting our atomic bomb program. This was hinted by David E. Lilienthal, chairman of the Atomic Energy Commission. He told the Congressional Joint Committee that strikes against certain AEC suppliers might be more serious than strikes against some prime AEC contractors.

Lilienthal. Federal Conciliation Chief Cyrus S. Ching, and James A. Brownlow, secretary-treasurer of the AFL Metal Trades Dept, expressed general approval of a suggestion by the Committee chairman, Sen Bourke B. Hickenlooper, Iowa Republican. This was that the government write a formula for operation of atomic plants which would provide proper and fair deterination of wages and working conditions. The formula would be part of the agreement with AEC entered into by a contractor. Persons taking jobs in plants covered by it would know the terms of employment.

The suggestion appealed to Lilienthal, who had stressed AEC's belief that private operation of atomic installations is preferable.

The AEC chairman told the committee that the scope of the problem would not be covered if it considered only the specialized operations owned by the government. Many essential suppliers are equally vital to the atomic program, he said, and the Committee will have to consider how far to expand any regulatory plan.

Injunction against the strike threat at National Laboratory was issued Mar 19, a few hours before the strike deadline. A three-man board of inquiry had previously reported to President Truman on the issues. Mediation will now continue. If the dispute is not settled in 60 days, the Board of Inquiry will make a second report to the President, this time including the company's last offer of settlement.

Within 15 days after the report, NLRB must conduct a secret ballot among the workers on whether they wish to accept the final offer, and certify the result to the Attorney General. Regardless of how the vote goes, the injunction must be dissolved within five days. The President must then report to Congress on the situation. It is assumed, of course, that if the workers vote to accept the final offer they will not strike, althought the law does not guarantee this.

Crux of the strike threat is the desire of Carbide & Carbon Chemicals Corp to pay the same wages and other benefits in the Laboratory which they took over from Monsanto Chemical Co on Mar 1, that they pay at the gaseous diffusion and electro-magnetic plants in Oak Ridge. The 950 skilled AFL workers in the Laboratory have had more favorable terms with Monsanto and want to maintain the differential. The company feels that to yield would serve to perpetuate an inequity which it may later have to correct by giving more to employees in the other plants.

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Georgia Power Pleads for End of 10% Discount

Georgia Power Co has asked the Public Service Commission for permission to discontinue the 10% discount for prompt payment of electric bills. The utility also desires to revise its entire rate structure. Elimination of the discount would increase gross revenues by $4,000,000 a year. Federal taxes would take $1,500,000 of this.

C. B. McManus, president of Georgia Power, explained that the utility must show a greater rate of return on its investment in order to attract new capital. The utility recently sold $10,000,000 in bonds. Now it must raise $12,000,000 more by sale of stocks. He pointed out that since 1941, Georgia Power has spent more than $41,000,000 in expanding service. Increase in gross income in 1947 was only $482,221 over 1941. This represented less than 1.2% return on the additional investment.

Georgia Power construction now in progress will cost $17,000,000.

Arkansas-Missouri Power Co Asks PSC to Revise Order Fixing Rates

ARKANSAS-MISSOURI Power Co has filed an application with the Arkansas Public Service Commission seeking withdrawal and revision of an order issued last December establishing a rate base for the utility, fixing rates, the rate of return on capital investment, and annual maintenance and depreciation allowances.

Coming as a complete surprise to the Commission (Arkansas - Missouri agreed to terms of the order as early as April, 1946, many months before it was issued), the application has aroused unprecedented interest in Southwestern utility circles.

"Strongest Protest in History"

PSC officials termed the application, "the strongest protest against our findings in the history of the Commission." The application, signed by James Hill, Jr., Ark-Mo president, charged that the order, if applied and enforced, would "result in gross injustices and inequities," and that the order as it now stands is unfair, unreasonable, arbitrary, and capricious."

The order affecting the utility was issued by the Commission after it had pretty well established several fundamental principles in a rate case involving the Arkansas Power & Light Co, which sells Arkansas-Missouri most of its power at wholesale.

A hearing extending over several years was conducted by the Commission in the AP&L case, and in June, 1944, the Commission issued an order embracing these principal regulations:

Regulations in AP&L Case

1. Establishment of the "prudent investment" standard for determining value of the company's property on which a "fair rate of return" is allowed.
2. Fixing of 6% as a fair, just, and reasonable rate of return to the customers, the company, and its investors.
3. Defining a "depreciation and maintenance allowance."
4. Establishment of a sliding scale adjustment of rates, designed to distribute automatically rate savings between the company and its customers.

In its application, Arkansas-Missouri raised these principal objections to the order—that:

Changes in economic conditions have resulted in increased costs and increasingly difficult financing;

The order would establish a grossly inadequate rate base and will deprive (the company) of the right to earn upon the total fair value of its property;

The rate of return set by the order is "inadequate and unfair and insufficient to allow applicant to maintain its financial integrity and to finance, without excessive cost and trouble, the additional investment which it is now required to make in new plants and facilities;

Maintenance and depreciation allowance set up by the order is "grossly inadequate" to enable it to keep its property at the high level of good operating condition required.

An indication that the Arkansas-Missouri may carry its case to the courts if its application is denied by the Commission is seen in the fact that the application charges that the Commission order violates the constitutional prohibition of confiscation of property without due process of law.

The application questions the Commission's authority to regulate, in effect, electric operations of the company outside the state or to make its order retroactive.

Specifically, the application asks the commission to:

Raise its $4,735,622 rate base on which a rate of return is figured,

Readjust the 6% rate of return "to a fair and reasonable level",

Increase its allowance for maintenance and depreciation, and to discontinue the commission's practice of considering these as a single item.

The Ark-Mo order was issued after the PSC's staff had informally investigated the company financial structure.

EARL O. SHREVE, left, vice-president of General Electric Co, receives the James H. McGraw Award Manufacturers Medal for 1947 from William T. Stuart, editor of "Electrical Construction and Maintenance"

McKellar Bill to Curtail TVA Opposed by Stewart

A bill introduced by Sen Kenneth D. McKellar, Tennessee Democrat, to curtail the administrative and financial powers of TVA drew support from a government agency and found the AFL and Tennessee's junior senator, Tom Stewart, lined up against it at Senate Public Works Subcommittee hearings this week.

Stephen B. Ives, head of General Accounting Office, Division of Corporation Audits, proposed to the subcommittee that all projects of TVA except power production should be approved specifically by Congress. Ives said the Comptroller General's office felt TVA should operate the same way as any other business-type project.

Senator Stewart said TVA had made such success that to give Congress closer supervision would "hamper seriously" every activity of the agency. He charged that the McKellar Bill "almost in effect abolishes TVA and then reestablishes it along different lines."

M. V. Hedges, representing the AFL unions in the Tennessee Valley, said that the McKellar Bill "virtually changes the whole concept and pattern of the Tennessee Valley organization in a direction that the workers of the valley feel . . . will penalize efficiency and firmly set back the clock of progress."

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Tallahassee, Fla., to Build Municipal Power Plant

The Tallahassee City Commission plans to start surveys for a proposed municipal power generating plant. The city will not renew its present contract with Florida Power Corp.

Although the contract does not expire until Jan 1, 1952, the utility has indicated that it would not renew on a long term contract unless an increase in power rates were granted. The utility claims it is losing $200,000 annually on present rates.

The 1947 legislature authorized the city to issue up to $5,000,000 in revenue certificates to finance construction of a city-owned generating plant.

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Rusk, Tex., Grants Franchise

Rusk, Tex., has granted the South western Electric Service Co a 20-year franchise. This settled the controversy over building a municipal plant, an issue which has arisen in every city election since 1910.

Legislation before Congress Threat to Status of FPC Hydro Licenses

THE STATUS OF LICENSES for hydroelectric projects issued by the Federal Power Commission is threatened by legislation passed by the Senate last week. Shortly after it was reported out by the Public Works Committee, the Senate routinely approved a resolution making possible a review of the license issued by FPC last June to the Bellows Falls Hydro-Electric Corp for redevelopment of the Wilder Dam on the Connecticut River. The measure, if passed by the House and signed by the President, would provide the first instance of serious Congressional intervention in FPC's licensing functions.

Legal experts pointed out that passage of the measure might lead to future Congressional review of hydro licenses granted by FPC. Such a development, they pointed out, might amount to virtual withdrawal by Congress of the licensing authority it granted the Commission under the Federal Power Act.

The Wilder project, located near White River Junction, Vt., affects the flow of the Connecticut in both New Hampshire and Vermont. It has been a hot political issue in the latter state ever since the Bellows Falls corporation originally proposed to expand the existing dam in September, 1944.

The utility first planned to replace the present 369-ft high dam with another 390 ft high to produce additional hydroelectric energy. The opponents, chiefly Vermont farmers, insisted during local hearings that the dam be no higher than 380 ft. The company then changed its plans to allow elevation of 385 ft.

Pending arguments before the New Hampshire and Vermont Public Service Commissions, FPC took no action in the case. Opponents of the project portesting approval by the State Commissions, carried the matter to the Vermont Supreme Court, which ruled that the state had no jurisdiction. In October, 1946, FPC issued an order approving redevelopment of the project at the 385-ft level and, the following June approved a license.

No petition for rehearing was filed by the Vermont farm group within the 30 days provided by Sec 313 of the Federal Power Act after either action by FPC. Later, however, Sen George Aiken, Vermont Republican, introduced a resolution to upset the license and provide further hearings.

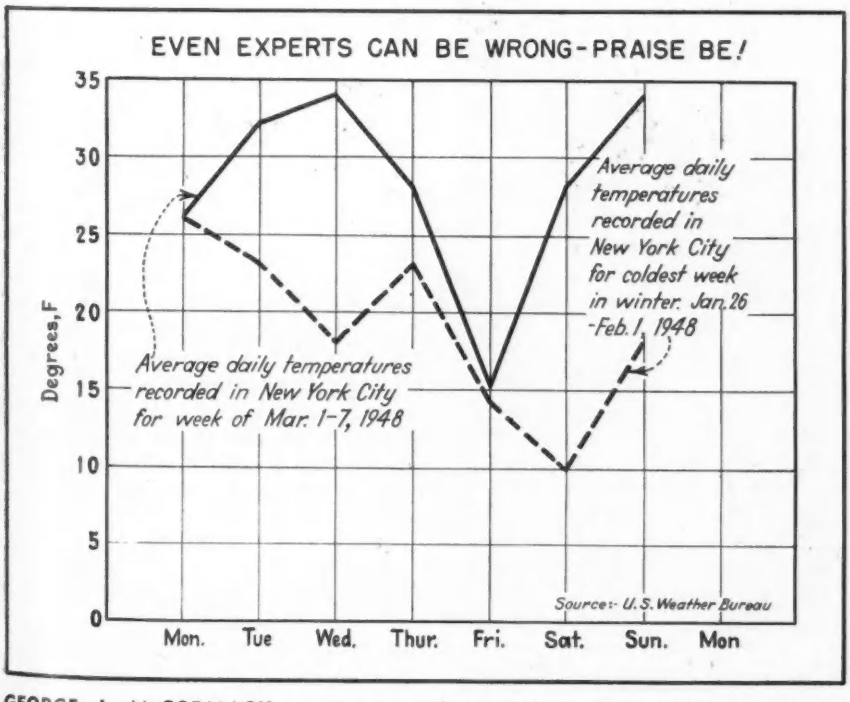
The Aiken Resolution, as amended in committee, would permit "any party to the proceeding" to apply to FPC for rehearing within 30 days after enactment. The case then would be in the same status it held immediately after the license was issued, with appeal to the courts available should FPC refuse a rehearing.

In hearings before the Public Works Committee, Governor Gibson of Vermont, who made an issue of the project during his recent successful election campaign, and other Vermont residents claimed they were not given "proper opportunity" to seek rehearing of the case. They said the proposed 385-ft dam would flood hundreds of acres of fertile farm lands. Such loss could be averted, they said, by reducing the height by 5 ft. Senators Aiken, Bridges, and Tobey also supported these views.

Total cost of the Wilder project, which would have an installed capacity of 28,000 kw, has been set by company representatives at some $13,000,000. The company already has committed itself to the extent of approximately $4,000,000 in preliminary works, it was reported.

The company protested the legislation, as did FPC spokesmen, during the Committee hearings. It has made no comment upon its probable reaction, however, should the legislation pass Congress. Independent legal sources asserted that the utility will have two courses of action in such event: either to agree with FPC on a rehearing or to fight the issue of inviolability of its license through the federal courts.

Under Secs 204 and 28 of the Federal Power Act, they pointed out, FPC licenses are protected from alteration of their permits by any action, including amendment of the act, other than the rehearing procedure specified by Sec 313. But Sec 204 does provide for changes "upon mutual agreement between the licensee and the Commission."



GEORGE J. McCORMACK, amateur weather prophet, who predicted that the coldest week of the year would be the first one in March (EW, Feb 14, Page 74), was wrong. And the spring floods predicted for April are now occurring

Seeks to Cut Discount

The Detroit Edison Co has applied to the Michigan Public Service Commission to reduce its prompt payment discount to 3% for all consumer classifications. The present rate for residential and commercial consumers is 10%, for industrial consumers 5%. If approved, the company will increase its gross revenues by about $6,000,000. Taxes will take about $2,500,000 of this amount.

Jacksonville Buys Line

Jacksonville, Fla., has purchased for $187,500 the 66-kv transmission line interconnecting the city utility system with that of Florida Power & Light Co.

California Rapidly Adjusts to Power Rationing; O'Brien Names Deputies

WITH NORTHERN and Central California power generation and distribution now under the control of "Czar" R. P. O'Brien, adjustments are rapidly taking place to smooth out industrial and agricultural hardships.

One of O'Brien's first moves was the appointment of two deputies to aid him in his power conservation tasks. They are Marshall J. Kimball and Manley W. Edwards, both senior utility engineers for the Public Utility Commission since 1937. O'Brien is organizing a staff, expected to number 40 persons, to carry out the regulations set up earlier this month.

At the end of the first week of Daylight Saving Time, the Pacific Gas & Electric Co reported that power savings had been about 150,000 kw during the evening peak and that it expected to make the 11,000,000 kwhr reduction set up as a monthly goal. Further savings resulted from rains that fell during the week, but irrigation pumping still made an abnormally heavy load.

Although the first few days of the 20% curtailment resulted in layoffs estimated by labor unions in the thousands, a survey at the end of the second week showed that many large companies were weathering the shortage without personnel cuts.

Industrial and agricultural power users are scouring the state for auxiliary generating units to add to their circuits to make up their power deficits. War Assets Administration offices in the area have been receiving up to 100 requests per day for small units. WAA is, however, at the suggestion of Gov Earl Warren, turning these appeals over to county agricultural officials who will allocate available sets for farm use. A few small government surplus machines will be obtainable later for industrial plants, WAA spokesmen said.

Illustrative of moves made by business executives to avert labor layoffs and production cutbacks is Paraffine Co's announcement that within three months it will have its own power supply. It is rushing installation of a 4,000-hp unit to supplement present facilities which already generate 45% of the company's needs. The firm, manufacturer of paints, floor coverings, and other building materials, employs 2,000 in its Emeryville plant.

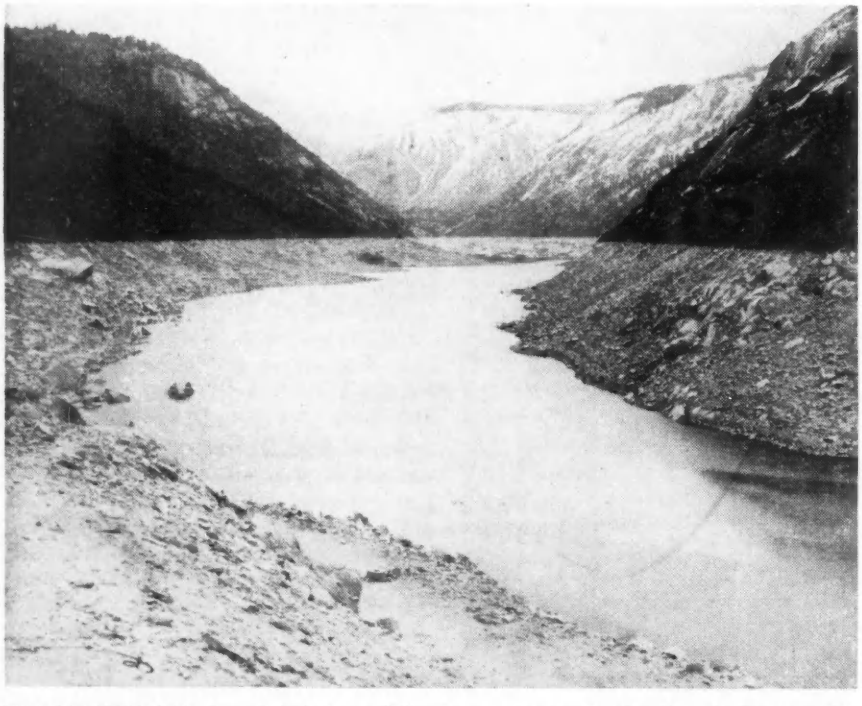
Some companies are attaching gas powered units to induction motors and running over speed to feed back into their lines the power from the improvised induction generator.

Some farmers were also taking steps to assure a future supply of energy for summer pumping needs. In the Sacramento Valley several irrigation districts have combined to order their own diesel generator. The Enterprise Engineering Co, San Francisco, maker of the equipment, said it had installed units with a total capacity of about 5,000 kw as a direct result of the water shortage.

While the drought area settled into the curtailment period, the Bureau of Reclamation revealed in Sacramento that its budget request now before Congress includes funds for investigating the feasibility of tying the California grid in with Bonneville. Preliminary estimates set costs for a 200-mi line to connect with the BPA system at about $6,000,000. Bureau spokesmen pointed out that in case of future drought in California, off-peak Bonneville power could be used to relieve excessive irrigation pumping loads.

At the same time, PG&E announced that efforts to rush construction on the company's Kern steam plant would result in a 101,000-hp unit on the line in mid-April.

This is the date set for the new 75,000-kw generator to be ready at Shasta Dam. As yet no agreement has been reached between the Bureau and PG&E for transmission of the added Shasta power without "middleman" profit as requested by Secretary of the Interior Krug.



WATER STORAGE has dwindled to 5% of capacity in Pacific Gas & Electric Co's Salt Springs Reservoir on the Mokelumne River. Ten days' capacity draft would exhaust the 6,500 acre ft now impounded. The reservoir has a capacity of 140,900 acre ft. The reservoir services three PG&E power plants with 122,000 hp capacity, Salt Springs, Tiger Creek, and Electra. Their daily output is now but a fraction of normal

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Puget Sound Utility Men End 2 Weeks' 'Slowdown'

Presented with a signed contract between Local 77 of the AFL Electrical Workers Union and the Puget Sound Power & Light Co, which the union had voted by a 2-1 majority to accept, outdoor workers of the company have ended a two weeks' work "slowdown."

The dispute started over a demand by 600 outdoor workers that they be given greater wage increases than other employees because of the greater hazards they encounter in their work. The union failed to support their demands, hence the slowdown.

Although the outdoor workers were unable to get union support for their wage demands, they were successful in getting a majority of the union membership to ask the resignation of Earl F. Wyatt, business agent. Wyatt refused, however, and can be removed only by international union authorities before his term expires in 1949.

Wisconsin Court Holds Public Utility Anti-Strike Law Unconstitutional

WISCONSIN'S 1947 public utility anti-strike law was held unconstitutional Mar 13 by Circuit Judge Alvin Reis. The case involved the Dairyland Power Cooperative.

Judge Reis (Dane County, Madison) ruled the law unconstitutional on his own initiative. And he denied the contention by cooperative attorneys that a cooperative cannot be classed as a public utility.

The Dairyland Power Cooperative had sought a writ of prohibition to stop the State Employment Relations Board from proceeding with compulsory arbitration in a labor dispute between the co-op and its IBEW union of electric workers at Eau Claire.

Constitutionality not at Issue

The issue of the constitutionality of the law had not been raised by co-op attorneys or the labor board in the proceeding. The law was enacted by the 1947 legislature forbidding strikes by public utility employees and providing for settlement of public utility labor disputes by compulsory arbitration.

Judge Reis said he was holding the law unconstitutional on the following grounds:

1. "As forcing utility employees into an involuntary servitude contrary to the federal constitution."

2. "As depriving public utility employees of their liberty without due process of law and thus violative of the federal constitution."

3. "In that the law discriminates against public utility workers and states to them: 'You shall be slaves—you shall not strike—but other Americans are free men—free to continue their labor, or free to strike.'"

Co-op Called Public Utility

Co-op Attorney Norris Maloney asked for the writ on the ground that the co-op is not a public utility and therefore not within jurisdiction of the anti-strike law. Reis held in his decision that the co-op is a public utility, but he granted the writ on the ground that the law is unconstitutional.

Judge Reis emphasized that appeal from his decision "unquestionably will be taken and should be taken" to the state supreme court.

In answer to Dairyland's contention that it is not a public utility because it sells power only to member co-ops, Reis said:

"Dairyland and its member associations constitute an allied and associated single group. The whole link-up reflects one organization, the business of which is to get electricity to the public embraced in the membership of those 50,000 (farmers) in Dairyland's 24 constituent associations."

The judge pointed out that the 1947 anti-strike law did not specifically exempt cooperatives as the state legislature has done in many laws which might affect co-ops.

Reis declared that a decision holding a public utility anti-strike law unconstitutional may be "roundly condemned by thousands" of people who do not want a strike which may cut them off from electricity gas, or water.

"This court does not want any such strike," Reis declared. "There is a limit, however, to what law can do to human beings. Balanced against one person's desire and need for electricity and gas, may be the positive legal right of that other man—the utility laborer—to stop working, and to combine with others to do so, for a lawful purpose."

The judge asked whether it would be constitutional to outlaw strikes in the food industry, packing plants or stockyards, steel manufacturing plants, schools or by newspaper reporters and editors—all of which might be considered just as "essential" as public utilities.

"Is Wisconsin entitled to make slaves out of the servants of public utilities?" Reis asked. "Our answer is: No."

Judge Reis admitted that the state has the right to regulate public utilities as monopolies and to permit them to exist by granting of a franchise, but argued that "a human being does not need a franchise for the state."

"The workers for the utility have no monopoly or anything that ordinary people do not enjoy," the judge continued. "Government cannot inflict special bondages on them, just because their employer may possess monopolistic privileges."

Declaring that for generations America has accorded reverence to the right of men to strike for legitimate purposes, the court attacked the anti-strike law because it would make a criminal out of every utility employee who should strike in a legitimate labor dispute.

Judge Reis said that perhaps the state legislature might have authority to forbid strikes by public utility employees until there has been arbitration of their dispute, but that the legislature has no right to force public utility employees into arbitration and then forbid them the right to strike even after arbitration.

Policies Not Affected

The basic commercial policies of the Line Material Co will not be affected by the recent Supreme Court decision (EW, March 13, Page 89) on price fixing under patent licenses. An official of the company told *Electrical World* that since the case is referred back to the Milwaukee court, there has been no final decision.

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First Atomic Power Will Sell for What It Will Bring

When by-product electric power first becomes available from operation of experimental atomic reactors, the Atomic Energy Commission's policy will be to sell the power on the market "for what it will bring"—rather than to attempt any cost analysis as a basis of pricing. Then the revenues from power would simply be used as a credit against the cost of operating the reactor.

In the first official statement on atom power sales policy, Commissioner Sumner T. Pike told the National Industrial Conference Board last week that "it is normal to expect" some such policy as above.

It looks like five to fifteen years, Pike said, before any atomic reactor is likely to be producing more power than is needed to operate its own pumps and blowers.

Pike revealed that thinking on practical power plants now points toward temperatures considerably higher than those in conventional steam plants—perhaps in the range of 1,000 to 1,500 C. He didn't say why such high temperatures will be needed, but presumably it's a matter of the size of the reactors. With concentrated fuels, reactors can be made quite small without reducing power production—minimum size might be somewhere between that of a baseball and a football.

To get the power out, of course, requires some heat exchange surface. Hence, the hotter the reactor's operating temperature, the smaller it can be.

Because of the high operating temperatures, Pike suggested metallic titanium might turn out to be an important structural material in future power piles.

Behling FPC Nomination Withdrawn by Truman

Nomination of Burton N. Behling for membership on the Federal Power Commission was withdrawn last week, minutes before it was to have been approved by a Senate committee.

President Truman's about-face on Behling came as a surprise despite the fact that it had been demanded some weeks earlier by Sen Joseph O'Mahoney, Wyoming Democrat. Informed sources told ELECTRICAL WORLD that the Senate Interstate and Foreign Commerce Committee would okay the Behling nomination Mar 19. They insisted that the Senate would confirm it, although a floor fight of considerable dimensions was in prospect following O'Mahoney's blast. Still, these sources insisted, the votes to confirm Behling were available. That they must have been seems implicit in the scheduling of the Mar 19 meeting of the Senate Interstate and Foreign Commerce Committee which was to report favorably on the nomination.

It was asserted, without confirmation, that opponents of Behling heard of the meeting and worked furiously to obtain the withdrawal.

James M. Mead, former Democratic senator from New York, was offered the post this week (Mar 23) but declined.

Behling's nomination went to the Senate first in May, 1947. It failed to reach a vote before last summer's recess and was re-submitted last January. Recently, it drew O'Mahoney's fire. This resulted from Behling's position, expressed in testimony before Congress, in support of proposals to amend the Natural Gas Act. The proposals were for changes in the Moore-Rizley bill, which had been opposed completely by FPC. But only two of four members of the Commission supported the counter-proposals to the Moore-Rizley bill. Behling's position, had he become a member, would have broken the Commission deadlock over changes in the Gas Act.

MEETINGS

Edison Electric Institute—Purchasing and Stores Committee, Hotel Cleveland, Cleveland, April 19-21; Engineering Committee, Edgewater Beach Hotel, Chicago, May 3-5. H. S. Bennion, managing director, 420 Lexington Ave, New York 17, N. Y.

Rocky Mountain Electrical League—Spring Conference, La Fonda Hotel, Santa Fe, N. M., April 22-23. Ralph B. Hubbard, manager, 558 Gas and Electric Building, Denver, Colo.

Pennsylvania Electric Association—Systems Operation Committee, Castleton Hotel, New Castle, May 13-14. H. W. Phillips, chairman, Philadelphia Electric Co, 1000 Chestnut St, Philadelphia 5, Pa.

American Society of Refrigerating Engineers—Spring Meeting, New Ocean House, Swampscott, Mass., May 31-June 2. M. C. Turpin, secretary, 40 West 40th St, New York 18, N. Y.

PREVIOUSLY LISTED

American Institute of Electrical Engineers—Conference on Electron Tubes for Instrumentation and Industrial Use, sponsored by the Joint Subcommittee on Electronic Instruments, Benjamin Franklin Hotel, Philadelphia, March 29-31; Great Lakes District Meeting, Fort Des Moines Hotel, Des Moines, Iowa, April 1-3; North Eastern District Meeting, Taft Hotel, New Haven, Conn., April 28-30; Summer General Meeting, Palace of Fine Arts, Mexico City, Mex., June 21-25.

Southeastern Electric Exchange—Accounting Conference, Henry Grady Hotel, Atlanta, April 1-2; Annual Meeting Boca Raton, Fla., April 8-10; Spring Conference Engineering and Operating Section, Tampa Terrace Hotel, Tampa, Fla., May 6-7.

National Association of Corrosion Engineers—Annual Conference and Exhibition, Jefferson Hotel, St. Louis, April 5-8.

Edison Electric Institute—Annual Sales Conference, Edgewater Beach Hotel, Chicago, April 6-8; Annual Convention, Hotel Traymore, Atlantic City, June 1-3.

Missouri Valley Electric Association—Engineering Conference, President Hotel, Kansas City, April 7-8; Rural Round Table, President Hotel, Kansas City, May 5; Sales and Rural Conference, President Hotel, Kansas City, May 6-7.

Midwest Power Conference—Sheraton Hotel, Chicago, April 7-9.

Indiana Electric Association—Young Men's Utility Conference, Ipalco Hall, Indianapolis Power & Light Co, Indianapolis, April 13-14.

Northwest Electric Light & Power Association—Engineering and Operation Section, Davenport Hotel, Spokane, April 14-16; Annual Business Meeting, Empress Hotel, Victoria, B. C., May 10; Business Development Section, Empress Hotel, Victoria, B. C., May 10-12; Accounting and Business Practice Section, Davenport Hotel, Spokane, May 17-18.

Electrochemical Society—Spring Congress, Deshler-Wallick Hotel, Columbus, Ohio, April 14-17.

Southeastern School Lighting Institute—Suwannee Hotel, St. Petersburg, Fla., April 19-21; Exhibit, Mirror Lake Junior High School, St. Petersburg, Fla., April 19-May 15.

Missouri Association of Public Utilities—Annual Convention, Hotel Jefferson, St. Louis, April 28-30.

National Electrical Wholesalers Association—Annual Convention, Hotel Statler, Buffalo, May 3-7.

Engineers Club of Philadelphia — Engineering Progress Show, co-sponsored by junior members and the Franklin Institute at the Institute, May 11-16.

Electrical Manufacturer's Representatives Association of Michigan—Industrial Electrical Exhibit, Convention Hall, 4484 Cass Ave., Detroit, May 12-14.

New Jersey Utilities Association—Spring Meeting, Seaview Country Club, Seaview, N. J., May 14.

American Public Power Association—Annual Convention, Broadmoor Hotel, Colorado Springs, Colo., May 17-19.

Public Utilities Advertising Association—Annual Meeting, Hotel Cleveland, Cleveland, Ohio, May 27-28.

Pennsylvania Electric Association—Prime Movers Committee, Hotel Casey, Scranton, June 10-11.

Arkansas Utilities Association—Annual Convention, Arlington Hotel, Hot Spring, Ark., June 14-15.

American Society for Testing Materials—Annual Meeting, Book-Cadillac Hotel, Detroit, June 21-25.

SEC RULINGS

LOUISIANA POWER & LIGHT CO has been authorized to issue and sell $10,000,000 first mortgage bonds, due 1978. Proceeds will be used for new construction. (Release No. 8014).

UTAH POWER & LIGHT CO has received authorization to issue and sell at competitive bidding $3,000,000 of first mortgage bonds, due 1978, and $3,000,000 of sinking fund debentures due 1973. Proceeds are to be used for construction purposes by the company and its subsidiary, the Western Colorado Power Co. Utah also proposes an increase in its authorized capital stock from 1,250,000 to 1,500,000 shares. (Release No. 8043).

WEST PENN POWER CO has been authorized to issue and sell $12,000,000 of first mortgage bonds and 50,000 shares of preferred stock, $100 par, and $2,500,000 of additional common stock. Bonds and preferred stock are to be offered at competitive bidding. West Penn Electric, parent, will acquire the common stock, subject to the preemptive rights of the public holders of the Power company's common stock to acquire approximately 5.451% of the new shares. Net proceeds, estimated at approximately $19,300,000 are to be used to discharge $4,000,000 of bank loans and for new construction. 1948 expenditures are estimated at approximately $22,646,000. (Release No. 8046).

ENGINEERS PUBLIC SERVICE CO, New York holding company now in process of liquidation, has received commission authorization to sell over the New York Stock Exchange its rights to subscribe to convertible debentures, due 1963, of Virginia Electric & Power Co. Engineers owns 162,612 shares of Virginia stock, for which it received an equal number of subscription rights. For each 25 rights held, the holder is entitled to purchase a $100 convertible debenture at $100 purchase price. (Release No. 8051).

TEXAS UTILITIES CO has been authorized to borrow $6,000,000 from its parent, American Power & Light Co, or from banks, the money to be advanced to subsidiary operating companies, Texas Power & Light Co and Texas Electric Service Co. Funds are to be used by the subsidiary companies to finance temporarily their construction programs, pending commission action upon permanent financing programs which the companies have filed with it. The loans will bear interest at the rate of 1¼%. (Release No. 8052).

TEXAS POWER & LIGHT CO has been authorized to issue and sell to its parent, Texas Utilities Co, 100,000 additional shares of common stock for a cash consideration of $1,000,000. Proceeds, together with treasury cash, will be used to redeem at par all of Texas Power's outstanding 2% series notes aggregating $1,875,000 and/or for other corporate purposes. (Release No. 8053).

SOUTHWESTERN GAS & ELECTRIC CO's proposed sale of $7,000,000 first mortgage bonds has been approved. (Release No. 7923).

Congress Gets Directed by NRECA Resolutions

What do the men who run the nation's rural electric cooperatives want Congress to do? Some answers to this question can be gathered from the resolutions passed at the recent annual meeting of the National Rural Electric Cooperative Association at Chicago. Here some 3,000 delegates from co-ops all over the nation urged that Congress oppose:

The Dondero Bill.

Any pending or future legislation which would alter the Flood Control Act of 1944.

The McKellar Bill (S1277) which would destroy autonomy of TVA and eliminate its revolving fund.

All legislation which would require public power to be sold at the bus.

Any legislation which would alter FPC's jurisdiction over rates.

All legislation which would diminish or remove federal control over the nation's navigable waterways.

Any legislation which would limit FCC in allocating frequencies. (This was directed at pending legislation to allocate certain frequencies by legislation.)

Actions for Congress to Take

The delegates also passed resolutions calling for Congress to:

Place no restrictions on generation loans.

Appropriate sufficient funds to build transmission facilities to deliver power direct to public bodies and co-ops, thereby overcoming sale at bus.

Speed up long-range power planning in the Northwest and provide adequate facilities to deliver electricity direct to co-ops and power districts.

Supply adequate funds for SPA transmission lines.

Provide for power and flood control projects on the Colorado River and its tributaries.

Conclude negotiations with Canada and begin the St. Lawrence project.

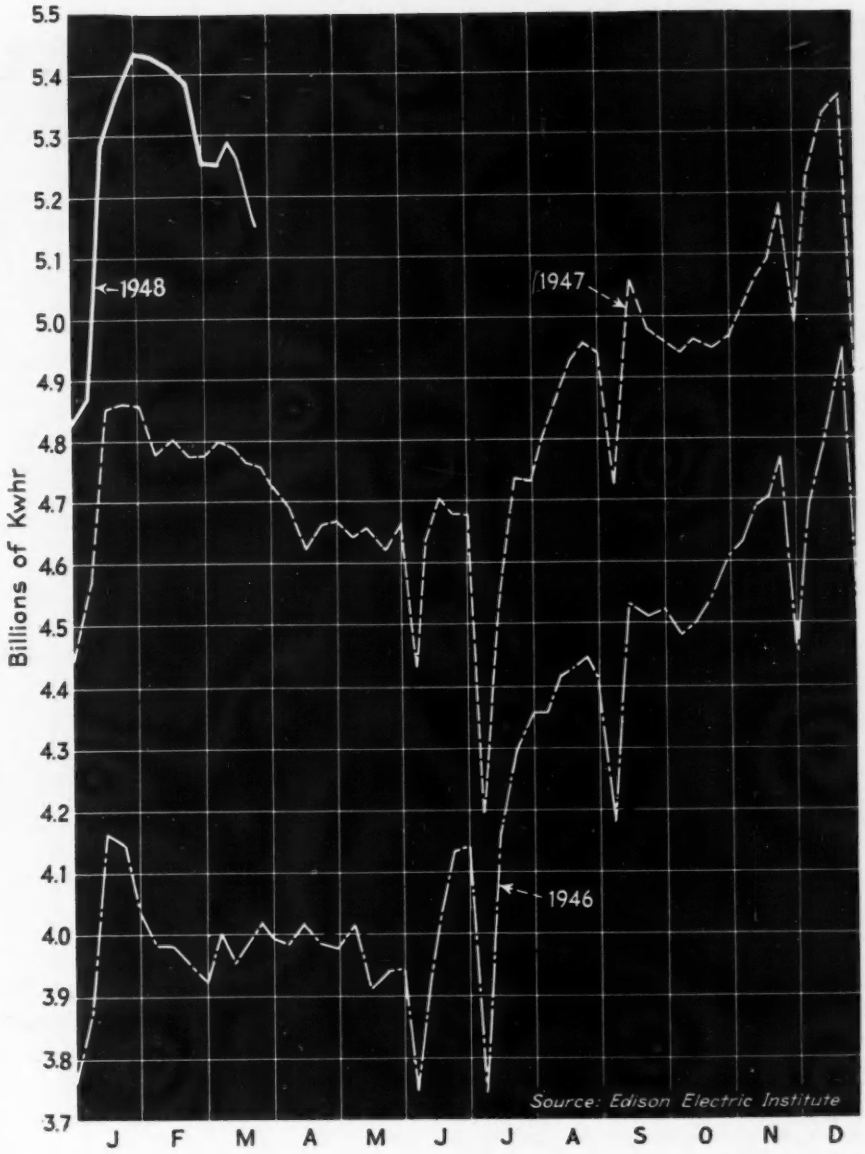
Pass HR5534 with all power development features and provide the War Department with adequate funds for flood control and rivers and harbors projects in 1949.

Establish a long-range program for authorizing loans to REA in sufficient amounts to complete nation's rural coverage.

Appropriate $605,000,000 for REA for fiscal 1949 and deficiencies of 1948.

Appropriate $500,000 for research to determine better techniques in farm power use.

Make funds available for building and improving rural telephone service.



Arput's Suffering from Billionitis

Output Editor Arput is convinced that the post-war era is here to stay. So he's doing some post-war planning. "And it's now fun," moans Arput. "These utility bosses who put out the output don't even know how much they're going to put out for new plant to build up the output. One guy says $5 billion. Another says $6 billion. Some say even more. Who ever thought the utility business would become as free and easy with a billion bucks as Uncle Sam? And, oh yes, unlike government expenditures, the output went down this week."

Weekly Output, Millions Kwhr

1948		1947		1946	
Mar. 20	5,145	Mar. 22	4,759	Mar. 23	4,017
Mar. 13	5,285	Mar. 15	4,764	Mar. 16	3,988
Mar. 6	5,293	Mar. 8	4,787	Mar. 9	3,953
Feb. 28	5,252	Mar. 1	4,797	Mar. 2	4,000
Feb. 21	5,254	Feb. 22	4,778	Feb. 23	3,923
Feb. 14	5,385	Feb. 15	4,778	Feb. 16	3,949
Feb. 7	5,412	Feb. 8	4,801	Feb. 9	3,983
Jan. 31	5,429	Feb. 1	4,777	Feb. 2	3,933

Percent Change from Previous Year

	Mar. 20	Mar. 13	Mar. 6
New England	+11.2	+13.0	+11.4
Mid-Atlantic	+ 6.1	+ 8.9	+ 8.9
Central Industrial	+ 7.3	+10.5	+11.0
West Central	+ 6.5	+ 8.4	+10.1
Southern States	+ 9.8	+11.3	+ 8.7
Rocky Mountain	+14.1	+13.7	+12.0
Pacific Coast	+ 7.8	+13.3	+14.6
Total United States	+ 8.1	+10.9	+10.6

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WASHINGTON COMMENT

WILLIAM B. WHICHARD

ASSORTED KNIGHTS in the more or less shining armor of left-wing liberalism have taken up their cudgels. The object: to frustrate what they call "the growing threat to the conservation of our natural resources." According to the latest communique from Washington headquarters of the group, they have tough opposition. This they identify as the "private utility, land, lumber and other interests."

The self-designated champions of conservation already have struck one blow for the cause. This took the form of a sort of manifesto entitled "Conservation Credo of an American." Recalling the activities in behalf of conservation by Theodore Roosevelt, Gifford Pinchot, George Norris and Franklin Roosevelt, the "Credo" is signed by the widows of the latter three. It also bears the signatures of a number of prominent leftist, or at least New Dealish, personalities both in and out of federal service.

Though it makes vague references to preservation of forests and the use of public lands, the "Credo" itself is little more than another appeal for public power expansion, in the main. It urges full exploitation of the nation's still undeveloped hydroelectric resources. It endorses the TVA-type of river basin development. There is even a demand for the construction of steam generating plants, as well as "all other facilities necessary," by federal agencies now marketing power.

In one respect, the document goes a little farther—but not by much—than the general run of statements put forth by public power enthusiasts. It baldly assumes the "autonomy of governmental conservation agencies," among them the Rural Electrification Administration and Bureau of Reclamation. And it opposes any "interference" therewith by private individuals or corporations. This is not the first hint that such agencies are prepared to function without any advice or back-talk from the people who pay the cost of government in tax money. But it has been a long time since anyone, even ardent New Dealers, talked that way for the record.

Copies of the "Credo" are being circulated broadly from the offices of one of the signers, Dewey Anderson. One-time chief of staff for the TNEC and later economic adviser to Sen Joseph C. O'Mahoney, Anderson now runs his own research organization in Washington. Another sponsor is Anderson's associate in this new enterprise, Stephen Raushenbush, late of the Interior Department's Division of Power. Other signers of the "Credo" include Morris L. Cooke and Harry Slattery, former REA chiefs; States Rights Finley, author Louis Bromfield and editor Bruce Bliven. In all, 42 persons, most of them former or practicing New Dealers, signed the document.

It is something of a surprise not to find the name of FPC Commissioner Leland Olds on this list. Olds sounded the same alarm—against the still undefined "threat" by private utilities—in a speech at Albany in November. And he did it better.

Perhaps Anderson failed to notice the Olds speech at the time. As we recall it, he was busy, just then, trying to persuade the armed forces to start building electric generators and turbines in their arsenals. This project he apparently has dropped in favor of "conservation."

TECHNICAL TRENDS

ARCHER E. KNOWLTON

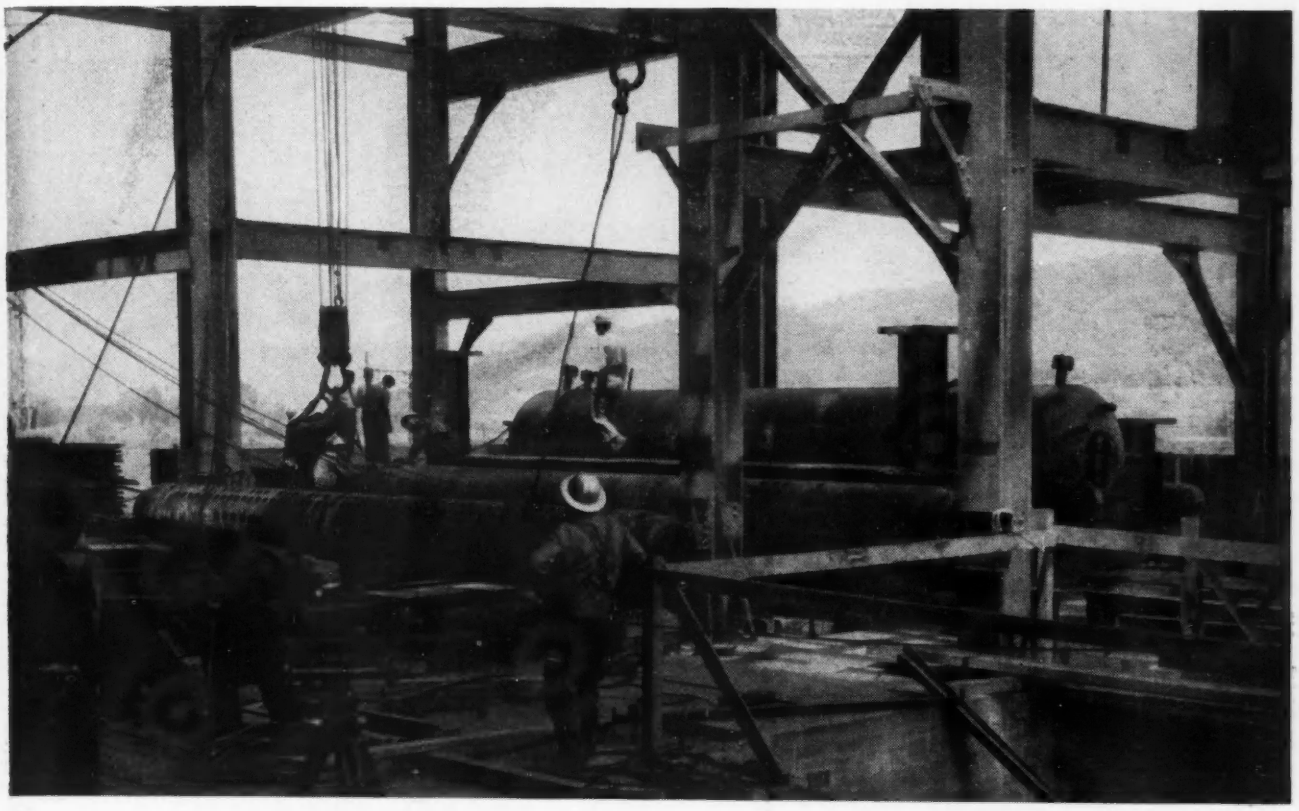
Turbine Reliability. It was remarked recently that the high-pressure section of one large turbine has not been *opened* for inspection in 11 years. Another unit has not been *off the line* in over 37,000 hours.

Peak Relief. Load dispatchers of one utility supplied the industrial sales department with copies of system load curves to help the salesmen negotiate with their industrial customers. The end result was the shifting of some loads off the peaks and into the valleys.

Marginal Circuit Capacity. When expenditures for generation have had to be increased it is usually the case that expenditures for transmission and distribution take, relatively at least, a downward trend. The assumption, fostered during the war, has been that there was considerable "slack" in the line capacity. That that slack can be used up is being realized. One operator expressed it clearly and cogently thus—"we have about taken all the stretch out of our transmission and distribution. We have just about reached the end of the rope in the direction of maximum use of facilities."

Reactors. Reactors have been used so extensively to limit duty on circuit breakers that the practice could become habitual. Instances can occur, however, where it proves less expensive to provide larger breakers than to use reactors to limit fault currents to the capability of smaller breakers.

Booms and Cranes. Few states or municipalities have regulations pertinent to the operation of rangy construction equipment in the vicinity of energized power lines. Community and utility are both entitled to elimination of the hazards and interruptions that occur when such equipment is operated carelessly. The conventional non-tampering statutes and ordinances *could* be construed as being equally pertinent to meters and overhead lines, and steps taken if interference is established in either case.



HERE IS THE REASON WHY YOU MUST START NOW TO BUILD LOAD . . .

Tomorrow May Be Too Late

IT MAY BE FOOLHARDY—and dangerous—to neglect load building plans. Now, while new capacity is being installed, is the time to consider how you're going to keep that high-priced capacity busy . . . at a profit.

Some types of load develop slowly of their own accord. They fluctuate, in volume and desirability. But *good* loads, unlike Topsy, don't "just grow." They must be planned . . . scheduled . . . and built to assure a steady and adequate return on your investment in new plant.

Here, in the following pages, are what a few of the many utility executives are doing to build their future loads and security now. Their plans include the recruiting and training of sales personnel, methods of enlisting dealer cooperation, organization for adequate wiring promotion, and the selling of planned lighting, electric cooking and water heating. All these activities contribute to bigger loads . . . better loads . . . and more profitable loads . . .

. . . and the time to start is now!

BILLBOARDS REITERATE the "All-Electric" theme and tell the company story, too

Why We Push The "Go All-Electric" Program

R. A. GALLAGHER
President
Public Service Co of Indiana
Indianapolis, Ind.

Customers' minds are being conditioned to acceptance of greater use of electric service, against coming time when company will be needing new load for its new capacity

IN THE FIVE YEARS from 1946 through 1951, our company expects to put $52 million into a new plant. We are figuring on earning a return on that investment.

This is why we are backing the "Go All-Electric" idea and are pushing it vigorously throughout our service territory.

We are investing $52 million to expand our business because we have faith in the future of electric service. We believe people buy our service because it is useful to them. We believe they will buy more of our service if we show them how it can be more useful to them.

It often happens that as a business becomes established and grows older a certain amount of corporate hardening of the arteries sets in. The old fire and enthusiasm die down and enterprise is displaced by caution and complacency. In promoting the "Go All-Electric" idea, our company is reviving in itself the spirit that built our industry. We don't think we have entirely thrown away our caution, but we certainly like to feel we have ditched all our complacency.

Capacity is just as much a headache to us as it is to most any other power company. We can look ahead, though, and see the time when we are going to want load. And we are beginning now to prepare for that day. We know of no better way to condition our customers—and ourselves—for that future time than by consistently talking up the values of electric service.

I can't truthfully say that we disposed of our gas utility interests in 1945 because we realized we could not "Go All-Electric" with our allegiance so divided. But since then, our business thinking has hewed closer to the one line than when we had to do our hewing on two lines.

We had some water service business, also some heating business; we got rid of both. The war put us out of appliance merchandising. We are still out and we don't expect to get back in. We now have only one business, electric service. Our entire job is to make a success of it.

Our company territory comprises central and southern Indiana. It includes 70 counties and 622 communities. The largest of these is Terre

HERE, IN THE RISING WALLS of a power plant, is the reason for the "Go All-Electric" campaign

Haute, population about 65,000. The next largest city we serve is Lafayette, about 30,000. Our total transmission line mileage exceeds 3,400 miles. At the end of 1947 we had close to 270,000 customers.

When the war ended we expected an abrupt decline in the demand for service. Instead, our load went up. It is still climbing. But our thinking is unchanged about the necessity for building new load. The rising load curve has merely postponed the time when we shall have to sell—hard.

In the meantime, we feel it is just plain common sense to get our customers ready to buy electric service on the scale that we shall want to sell it. We are doing this by driving home the "All-Electric" theme.

Since our company does no merchandising, this "All-Electric" selling helps to build and maintain pleasant relations with the local trade. In every advertisement that features electric appliances, we advise our customers to "See Your Dealer."

Another facet of this campaign is the dealer cooperative plan. In this, "tie-in" ads are prepared, and offered, in full-page and half-page units to the Appliance Dealers Associations throughout the territory. These advertisements feature such subjects as "Electric Home Laundry" . . . . "Electric Refrigeration" . . . . "Electric Home Freezer", etc. This program has been received enthusiastically by both dealers and newspapers alike.

Our company has used mailing pieces, bill stuffers, billboard and indoor posters, newspaper advertising, and other material available from the NEMA group sponsoring the "Go All-Electric" Program. The material we have thus obtained includes:

75,000 self-mailers in equal quantities of 3 different kinds.

327,000 bill stuffers in equal quantities of 3 different kinds.

112 24-sheet billboard posters.

2,200 indoor posters, 30 in. by 40 in., of 4 different kinds.

10 electros of newspaper advertisments.

In addition to this, we have acquired an extensive library of sound films. These are in constant use by luncheon clubs, women's organizations, and student groups. We have 125 copies of the "Electric Appliance Sales Handbook" by Laurence Wray of *Electrical Merchandising* and these are being used by our own staff and by the dealers.

With this activity, Public Service Co of Indiana is intensively pushing the "Go All-Electric" program. What we are doing is only a fraction of what we expect to do. And it is only a fraction of what we must do to turn into works the faith we have in this business of electric service.

R. A. GALLAGHER

Salesmen Must Be Recruited and Trained

Sources from which potential sales personnel may be drawn . . . Careful selection is essential . . . Training methods and their use are described

A SALES TRAINING CLASS at the Electrical Institute of Boston at top. Hawaiian, Chinese, Filipino, Caucasian and Japanese personnel, below, take the EEI course sponsored by the Hawaiian Electric Co

A FORMIDABLE CHALLENGE to electric utility sales managers is presented by the millions of kilowatts in new generating equipment now on order. The thought that, if customer demand dwindles or even ceases to grow, a large part of this new capacity might one day be standing idle, is one to cause concern to any sales manager.

To meet this challenge, commercial executives must rely primarily upon sales forces that have been rebuilt since war's end. This means a job of recruiting, selection and training that is almost as complicated as constructing a new power plant, and is as important to the company's welfare.

Finding Sales Personnel

In any list of sources of sales personnel, the company itself usually takes first place. Normally, it will be faster and easier to train a man who is presently employed than to qualify an outsider who must be taught not only selling, but also company policies, rates and many other things that a company representative must know.

Schools, of course, are a prime source of new salesmen. One authority estimates that there are now about 250,000 students in business colleges and schools of commerce. He predicts that one-third, roughly 83,000, of these trained young men and women will seek positions in the distribution side of business. The electric company can use its share of these graduates. School placement bureaus should be kept informed of the job possibilities the company has open. Graduates who have experience in jobs requiring frequent contact with the public are usually best suited for sales positions.

Church, social, fraternal, civic and veterans' organizations are eager to assist their members. They will often turn up a surprising number of sales prospects. This field can best be cultivated by personal contacts.

The personnel departments of other local companies frequently have applicants they are unable to use. They will be glad to refer those with sales possibilities to the utility, if requested.

Aptitude Tests Are Useful

To help the sales manager select those best qualified for selling positions, several types of aptitude tests are now available. Detailed procedures for selection and placement of sales employees have been developed by trade associations, colleges and business organizations.

However well adapted these tests are—and several electric companies have reported good success with them*—it must be realized that securing qualified prospects is only the beginning of the job of building up a sales organization.

No matter what inherent ability a new man will have, it is certain that he will need long, hard training, before he is ready to put load on the lines in a profitable manner.

Foreseeing the need for the best possible teaching aids to be used in the rebuilding of our industry's sales forces, the Edison Electric Institute, in consultation with the National Electrical Wholesalers Association, made available, early in 1946, an all-industry sales training program. This course consists of a series of 18 sound-slide films, with accompanying printed materials to be used in a series of meetings.

It is an all-industry course, salesmen of utilities, dealers, wholesalers, manufacturers and department stores can all be trained efficiently with this one program. Sound-slide films permit training objectives to be driven home through both eye and ear. There are 18 in the series since educators' experience shows that a series of brief films and meetings is better by far than two or three long sessions.

Of these films, 8 cover basic sales training, teaching fundamentals that can be applied by every salesman. A basic sales pattern is taught, which can be used by domestic, rural, commercial and industrial representatives.

Four residential films, describing how these principles can be applied in selling electric refrigerators, ranges, water cooking appliances and motor applications, are covered in 4 meetings for commercial salesmen. Two meetings discuss various farm applications of electric service.

The sound-slide film, which features each meeting, is accompanied by a silent trailer film for full analysis and discussion of the points made in the sound film. There is also a salesman's manual, which covers the same material and is distributed at each meeting. A leader's guide, with practical suggestions for the person conducting each session, completes the package.

Training Courses Widely Used

Released early in 1946, the EEI sales training program was an immediate success. Electric companies, leagues and associations, electrical manufacturers and others in unrelated industries have purchased well over 200 sets of the eight basic films. During the last two years, many thousands of electrical appliance salesmen began their careers with this effective training.

The method of presentation in any area varies with local conditions. Utilities and other sponsors find the program sufficiently flexible to be easily adapted to almost any arrangement.

The Utah Power & Light Company's experience is a good example of the way in which the course can be used to train all elements of the industry in one company's territory.

W. A. Huckins, general sales manager, first presented the program to his company's salesmen as a refresher, and also to select from among them a staff of instructors who in turn would train wholesaler and dealer groups. A total of 44 home-service, dealer-contact, lighting and commercial representatives of the company completed the course. Eight students received additional training as preparation for their instructional duties.

A preview of the entire program was then presented to a cross-section of distributors and dealers. Opportunity to have their sales forces take the course was offered. Training was given in their own offices at any time desired. General Electric, Westinghouse, Graybar and other distributors took this training.

Dealer groups were then organized for instruction, with training programs being scheduled in each company division. Every dealer in the company area was offered the basic and residential courses as training for his sales personnel. After completion of the EEI course, specific product training classes were then held by each distributor for his dealers.

And now, more than two years after the course was released, the Utah Power & Light Co is still actively engaged in sales training. This is proof of the value of this program.

Dealer Participation

The January, 1948, issue of "Electro Dealer," a company publication, announced that 302 dealer personnel had so far received certificates of achievement upon completing the course. The same issue carried five stories of dealer training classes that had recently completed the EEI program.

"Offered free to all electrical sales people, the course is outstanding in its field, and will continue during 1948," the publication says. "With the market becoming more competitive, it behooves all salesmen to take stock of their selling methods. Remember, it pays to be informed!"

This company's success with the training program is paralleled by that of many others, large and small, urban and rural—companies such as Birmingham Electric, Detroit Edison, Pennsylvania Power & Light, Boston Edison, Portland General Electric, Georgia Power, Pacific Gas & Electric, and scores of others. Electrical leagues, such as the St Louis Electrical Board of Trade, Electrical Association of Philadelphia, Electrical & Gas Association of New York and many more, have reported enthusiastic reception of the program.

Their experience indicates that companies employing this course to train men who have been carefully selected for sales positions are assuring themselves of efficient, productive sales forces—able more than to hold their own, no matter how severe the competition in the years ahead.

* Pennsylvania Power & Light Co reports on this in ELECTRICAL WORLD, January 3, 1948, Page 43.

POSTER in front of first home certified by Central Wisconsin Adequate Wiring Bureau is admired by the electrical contractor, W. F. Fisher, center, and, left and right, B. H. Blanc, district manager, and L. J. Alberts, district sales supervisor, Wisconsin Power & Light Co

A. A. KAUFMAN, CWAWB officer, receives license from National Bureau via G. C. Neff, WP&L president

Why And How Of An Adequate Wiring Program

M. R. NORTON
Dealer Cooperation Manager
Wisconsin Power & Light Co
Madison, Wis.

Puts little or no strain on present capacity . . . Gets things in motion for future load building . . . Presents good opportunity to work with the trade

IN THE SPRING of 1947, we decided it was time to get an adequate wiring program under way in the territory served by our company. We felt that it would "put little immediate pressure on capacity and would prepare today's homes for tomorrow's load growth."

The problem we faced was difficult. The Wisconsin Power & Light Co serves 92,000 residential and 30,500 rural consumers, spread out over the "Heart of Wisconsin." Ours is a farming and dairy area, dotted with 323 communities, only 4 of them in the 30,000 population class. We have 14 operating districts, each with a district manager, and a sales supervisor. And nowhere in the area was there an Electric League or other trade group to carry forward the Adequate Wiring plan.

We started the program with a conference of five leading electrical contractors and one electrical wholesaler. They were selected for their interest in better wiring and their experience with local adequate wiring groups before the war. J. D. Howard, general sales manager of the company, and two of us in the dealer relations division joined in the huddle. The outcome of this get-together was a name (Central Wisconsin Adequate Wiring Bureau), a slate of officers, a plan of action, and an application to the National Adequate Wiring Bureau for a license to operate the certification plan in central Wisconsin. The area corresponds roughly to the territory served by our company throughout the farming and dairy area of Wisconsin.

When the license arrived, a meeting was called to explain the program to the promotional committee consisting of two electrical contractors and the company sales supervisor in each district. The license was formally presented to A. A. Kaufman, electrical contractor and chairman of the executive commitee, by G. C. Neff, WP&L president. The members of the promotional committee were asked to go back to their respective areas and arrange group meetings of all electrical contractors so that the program could be presented to them.

Training of our own district peo-

ple came next. An entire day was devoted to the initial session. District sales supervisors were given the information necessary to help them supervise the program locally. Commercial sales representatives—one or more from each district — were trained to check the jobs for wiring adequacy. Home economists were trained in outlet arrangement so that they could give effective help to home makers.

Group Meetings

Next we started going out to the group meetings of electrical contractors arranged by the district promotional committees. Each meeting starts with the Westinghouse movie, "The Dawn of Better Living." Then we undertake to explain:

What the certification plan is.

How it benefits the customer.

How it benefits the electrical contractor.

How it benefits the appliance dealer.

Who determines the standards.

How the plan is administered in local areas.

How the standards supplement the electrical code.

How to go about having homes certified.

Why the utility is interested.

How outlets should be arranged to meet the standards.

How many circuits are needed.

What the entrance sizes should be.

A brief discussion period follows and the contractors are urged to express their opinions.

Contractors Contribute

Since there is no electric league to sponsor the program, each contractor is asked to contribute $2.00 annually to become a member of the Central Wisconsin Adequate Wiring Bureau. About 95 cents out of each $2.00 is used to buy the materials to fill a big envelope which is given to each member along with his membership card. This envelope contains two copies of the "Handbook of Residential Wiring Design," one electrical symbol guide with plastic rule, four layout sheets, one 8-in. decalcomania for store window, a folder showing mats and electros for use in advertising, samples of pamphlets and literature to use in promoting the program, a copy of "The A/W Reporter", a sample certificate and a price list to make it easy for him to order additional supplies. The remainder of his membership dues goes toward buying certificates, house posters and material for an advertising campaign to building contractors.

After the first 7 district meetings of wiremen, we have a membership of 95 electrical contractors who have paid their dues. We expect to have about 200 members this spring.

As of January 31, the wiring in 8 homes has been certified and 10 additional homes have had the work roughed-in according to A/W standards and had advertising posters placed in front of them.

Dates are now being arranged for group meetings of the building trades, including building contractors, building supply dealers, real estate operators, banks, etc. Demonstration equipment is nearly completed to put some glamor and life into the wiring story. These programs will start out with a demonstration of the need for more outlets. This will be followed by demonstrations showing the need for plenty of circuits and a heavy entrance.

Similar programs will be given to as many meetings of customers as possible—civic clubs, granges and other groups. As soon as can be arranged, electrical contractors who have joined the bureau will be called together in each district to lay plans for local promotions which can be carried as far and as rapidly as each of the 14 local groups desires. We plan to participate in these local promotions with appropriate advertising and display. This method will adapt itself to variations in local personnel and interest. It suits our present needs better than uniform, area-wide promotion.

Plan for Success

It is apparent that the success of the program in each district is partly determined by the time which can be devoted to it by sales department employees who have many other duties to perform. Some of this interest and cooperation stems from the many educational meetings held during the past eighteen months.

Every effort is made to spend enough time with each interested contractor to get him started carrying the ball. The district home economist will help him sell his customers on the benefits of certification if necessary. The two wiring checks (we don't like to call them inspections) are made without charge by the district commercial sales representatives.

AT ONE of 14 district meetings, electrical contractors of Tomah, Wis., hear about the Adequate Wiring Program

Why Electric

J. F. BURT
General Sales Manager
Western Massachusetts Electric Co
Pittsfield, Mass.

IN 1947, 1,200,000 electric ranges were sold. In all its quarter century of sales history, 1947 was the biggest year for the electric range. Range sales more than doubled over the previous year. Something to crow about, indeed. A remarkable achievement of which we should all be proud. It demonstrated, we told ourselves, that now, the electric range had won public acceptance.

But had it?

In the same year of 1947, a range that was practically unknown before the war sold 1,600,000 units. These were gas ranges, LP gas ranges. So let's not feel too smug about having won wide public acceptance. The fact is we haven't won it and a change of pace is definitely indicated if we are ever going to win it.

Electric cooking has never been, and is not now being sold by the whole electrical industry. Yet we know that it takes a couple of years for an educational type of program to become really effective. Oh, yes, there is electric range advertising in national magazines. But it is product advertising. It does not diligently and enthusiastically promote electric cooking. And yes, some electric companies are doing a real job of selling electric cooking in their service territories. But these efforts are sporadic in both time and geography. They do not add up to continuous

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GAS RANGE ADVERTISING is supported by advertising of gas cooking. Where is the electric cooking support for electric range advertising?

Cooking Needs Industry Promotion

No effective response to competition . . . No organized national promotion of residential electric service . . . Future demand may be far under potentialities of market

and consistent national promotion.

In many national magazines you will find advertisments extolling gas cooking—its virtues of automatic control, smokeless broiling, uniform baking, thrifty roasting, speedy cooking, variable heats, modern design, cleanliness, easy operation, year-in year-out economy. This consistent promotion is establishing a level of public acceptance that should knock the wind out of any complacent attitude.

The job of promoting electric cooking, which must be sold first, before people will buy electric ranges, is partly if not largely a responsibility of the electric utility industry. The makers of electric ranges cannot be expected to do the entire job and they don't do it. Their concern is to sell their products as products and that is what they are putting their promotional effort into.

Makers of electric ranges compete among themselves in the sale of their products. It is natural and right that theirs should be product advertising and promotion at this time when the market is taking all their output. They are preoccupied with the job of getting, of enlarging if they can, their share of a waiting market. Their attention and production facilities thus occupied, they cannot be criticized for neglecting the less immediately rewarding, and the, for them, largely altruistic task of large-scale promotion of electric cooking as such.

On the other hand, the electric utilities are not in competition among themselves. The energy one electric company sells for electric cooking does not represent the loss of an energy sale by another. The utilities do not sell products of many makes, but service of a single kind. Electric cooking is a use of our service; therefore, to sell our service we should sell electric cooking.

Promotion of electric uses, which is both a seller of electric service and a seller of the products by means of which the service is used, is not a new thing to our industry. As a matter of fact, we have been the pioneers of promotion for every use of our service.

Competitive Effort

In the past, the local effort the electric utilities put into promotion was reasonably effective against the local competition that was encountered. Now, in respect to electric cooking—and other service uses, too—we are up against competition on a national scale. It is intelligent, resourceful competition, amply backed with the necessary wherewithal. That competion should be met in the field in which it operates. It cannot be met effectively outside that field.

I have talked so far here about electric cooking because it is that particular service use that is now encountering strongest competition. But my argument for a nationally organized and operated promotional activity covers the whole field of electrical living, covers all the uses of electricity in the home. It is in cooking that the need for such activity is most apparent, because of the direct competition. But all the other uses have their competitions too. It is the indeterminable, but very real, competition for the available dollar.

Numerous market studies and researches into customer attitudes and buying intentions, local, regional and national, told us that there would be a tremendous post-war demand for domestic electric appliances. That demand materialized. It is not yet satisfied.

In our work to meet that demand, we have, I think, overlooked two important things about it.

One is that it is big, very big, only in proportion to what it had been previously. It is not big, in fact it is pitiably small, in relation to the population of the country or to the number of residential electric customers.

The second thing is that it is an accumulated demand resulting from desires awakened by long-past promotion and dammed up for four years. Left alone, the present demand for domestic electric appliances and for the electricity they use, will decline to some level that will be comfortable for some people because it won't be a bother to them. If that is representative of electric company commercial philosophy, then let's leave the demand alone and let it peter out to whatever it may become.

But if we want the demand for our service in the residential field to grow up to its potentialities, then we've got to go to work on it. We've got to go to work on it right now.

I end this exhortation by giving my electric company friends a specific thing to ponder over. Why did the Maytag Co, long identified with the electrical industry as a washing machine manufacturer, bring out a gas range?

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Ready And Waiting . . .

The Water Heating Load

M. M. FEAMAN
Chairman
Electric Water Heating Section
National Electrical Manufacturers Association

Competitive position of electric water heating greatly improved by growing requirements of hot water in American homes . . . Manufacturers eager to assist

"SPECTACULAR" is the word to describe the increase in electric water heater sales since the war. Previously the water heater had been a tailender, plodding along far behind other appliances. Now it is up there with the field and going strong.

In the 8 years before electric appliance production was stopped by the war, annual sales of water heaters averaged 114,000. The spread was from 70,000 to 205,000. After a slow start in 1945 with 95,000, sales rose to 488,000 in 1946 and to 1,100,000 in 1947, averaging 561,000 for the 3 years. Water heaters now are selling 5 times as fast as before the war.

That startling fact becomes more so when comparison is made with electric range sales. The annual average of range sales for the 8 pre-war years was 356,000. This was 3 times the water heater average. Range sales went up after the war too, but not with anywhere near the speed of the water heater climb. Ranges have been sold at an annual average of 617,000 since the war, less than twice the pre-war figure. The record range sales of 1,200,000 in 1947 were only 100,000 above water heater sales.

In 1941, the biggest year for both before the war, water heater sales were 28% of range sales. In 1947, they were 92%.

IN THIS BOOK heater manufacturers show how utilities can get the help of the plumber in development of water heating load

Reason for Rise

One could cite a number of reasons why electric water-heater sales have risen so spectacularly. But all the particular reasons are covered by one inclusive reason. It is that the market is larger than most utility people and manufacturers have been accustomed to think of it.

Expansion of the market has resulted from a generally increasing use of hot water in the home. Automatic clothes washers have contributed substantially to the increasing use. Dish washers have chipped in with their requirements. Also hot water is one of the greatest amenities of modern living and people just naturally keep on using more and more of it.

As hot water use has increased, larger tank sizes have become necessary for automatic gas and oil heaters. Previously they could be made with comparatively small tanks because their recovery ability was high. Electric heaters, using moderate-sized units to meet electric utility rules, did not have such a high recovery rate and their storage capacity had to be greater. Since heater cost was largely determined by tank size, a price handicap was imposed on the electric heater.

Larger hot water demands have changed this picture. See how the automatic clothes washer has done it:

The average automatic washer requires about 55 gallons of 140 deg F water in about 2½ hr to do the week's washing all at once. The usual gas or oil heater does not have a tank large enough to meet this demand and the heretofore ample recovery rate is not sufficient compensation. A larger tank is the answer and this raises the heater cost.

Simultaneous with the growing need for larger tanks in gas and oil heaters is a trend towards higher wattage elements in electric heaters. Thus the cost of the one is increasing and the performance of the other is being improved. Result is a definite bettering of the competitive position of the electric heater in respect to gas and oil.

Gas and Oil Competition

Gas and oil have long been thought of as the principal competition of electricity in water heating. This is true only as regards automatic heaters, which are installed in about 10 million homes. But in the whole field of water heating, coal is the real competitor. More than 10 million homes obtain hot water from coal-fired heaters and from furnace coils.* And

* "What Factors Most Influence Future Water Heater Sales", by Gregory L. Rees, Edison General Electric Appliance Co, ELECTRICAL WORLD, April 14, 1945, Page 100.

there are about 14 million homes that have no water heating at all.

In these homes that have non-automatic hot water supply, or have none at all, lies a great part of the market for electric heaters. The comfort and convenience of ample hot water, available when wanted, is making many of these homes prospects for electric heater sales.

Probably more than three quarters of the wired homes in this country have available to them rates at which the benefits of electric water heating can't be enjoyed at reasonable cost. Rates that make electricity generally competitive with gas and oil are available to over 60% of residential customers.

Despite high building costs, an impressive number of new homes have been erected since the war. Probably more than 1½ million new dwellings through 1947. And more are being built. Here, by itself, is a market that could have taken, probably did take, a big chunk of 1947 electric water heater sales.

Affecting Factors

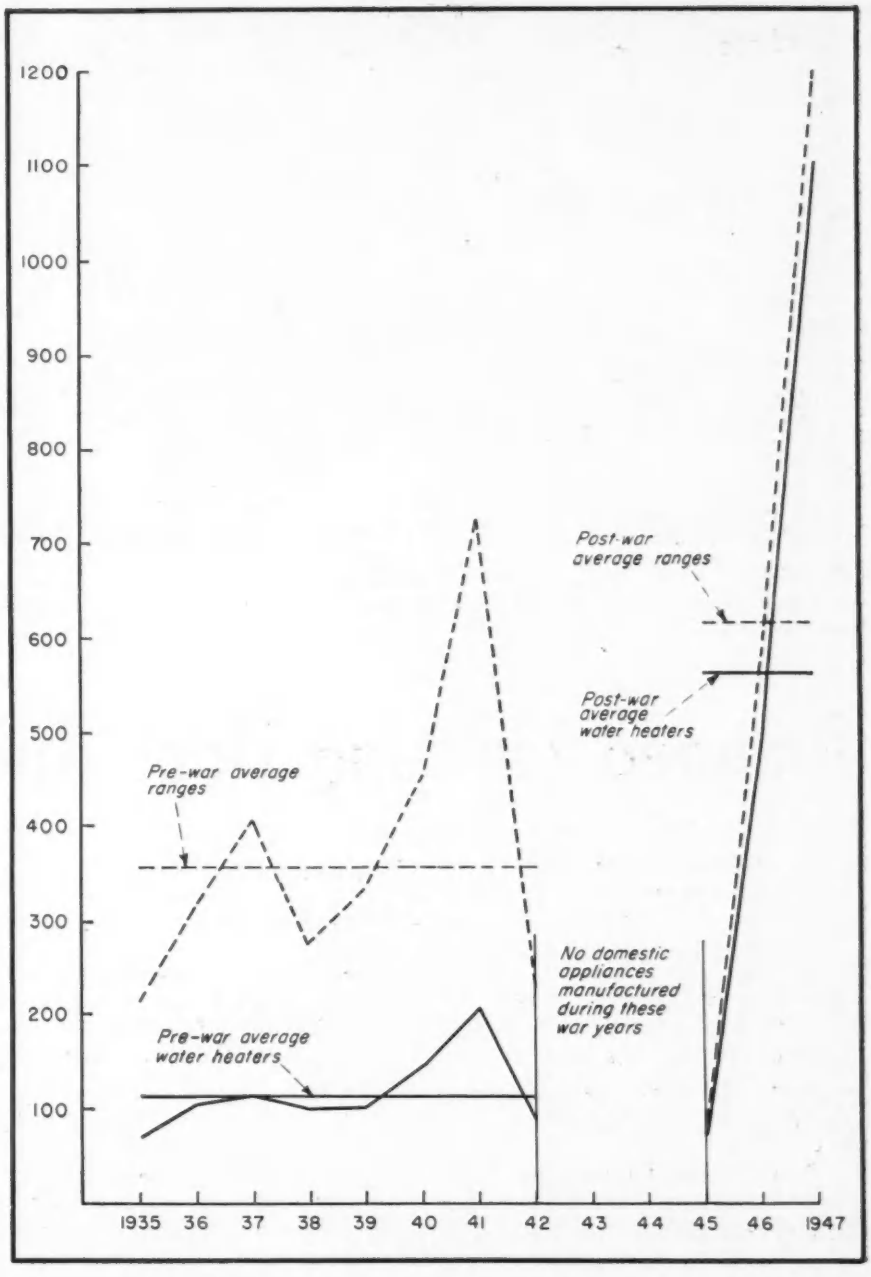
Here then are four considerations, all favorable, that affect electric water heating—improved competitive position of the electric heater, increasing use of hot water in homes, a large market growing larger, and reasonable operating cost. The makers of electric heaters see this market and want their share of it. That is why the Electric Water Heater Section of the National Electrical Manufacturers Association has recently directed to the electric utilities a presentation, "You Need the Plumber to Build Peak Profit Load."

In this it is pointed out that only with the plumber's help can a really high level of electric water heater sales be reached in the territory of any utility. The plumber should be sold the electric heater, shown that it means profit to him. The presentation includes a program for enlisting the plumber's interest, with publicity and other material for staging the promotion.

The plumber is characterized as the "forgotten man" in the electric water heater picture. For the most part, he is an effective salesman of competing heaters; this is because the electric heater and its profit potentialities have not been sold to him.

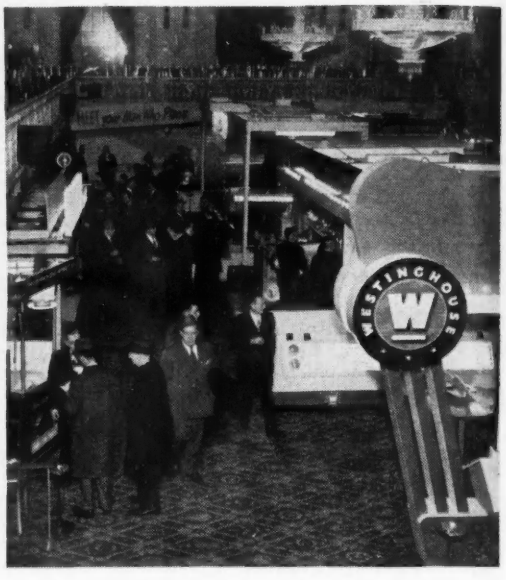
The electric heater has been sold heretofore mostly, if not entirely, as an electric appliance. It is also a plumbing appliance, like a bathtub or a sink. To neglect the plumber as a logical salesman for it is simply to ignore a large field of sales prospects.

There is a tremendous market waiting for electric utility service in water heating. The spectacular rise in electric heater sales since the war proves it. Water heating is a desirable load. This is proven by the large proportion of residential customers to whom rates favorable to it are available. Makers of heaters have proven by their "plumber" presentation that they are desirous to assist utilities in building water heating load. What remains is for the utilities to capitalize on the opportunity water heating offers them.



SINCE THE WAR, heaters sales have zoomed—proof that people want the convenience of electric water heating installed in both their present and postwar homes

"KICK-OFF" DINNER and preview of Pittsburgh Exposition drew 700 actively interested members from manufacturer, wholesaler, contractor, utility and other electrical industry organizations



OFFICIAL REGISTRATION totalled 6,700 representatives at Pittsburgh's Planned Lighting Exposition. 47 manufacturers filled three large exhibit halls

Planned Lighting Does Build Profit Load

GORDON H. MAIZE *
Duquesne Light Co
Pittsburgh, Pa.

Trained salesmen and cooperation with trade allies are essential to success in selling modern lighting as it should be sold

SINCE IT BEGAN there, the Planned Lighting Program could have nothing less than vigorous application in Pittsburgh. How is it doing? I'll try to give a complete answer.

First, let me fill in some background. The Duquesne Light Co has 36,000 commercial accounts. Of these, about 20,000 are reckoned to be PL prospects. The breakdown of the 20,000 includes: Stores—12,000; schools—1,000; offices—1,500; and miscellaneous—5,500.

Lighting is not sold by specialized salesmen. The men who are doing the job are all-purpose commercial salesmen. Including supervisors, there are 17 of them. They make layouts for the smaller, simpler jobs. For the larger, more complicated ones, they call on the company's illuminating engineers for assistance. As soon as the problem of producing kilowatt-hours eases a little, we hope to add 5 more men to the company's force.

The results of any sales effort are measured finally by money in the till. This, as every sales executive knows, is an extremely difficult measure to apply. Revenue is affected favorably or unfavorably by many other factors than sales effort alone or the lack of it. However, we are certain that our Planned Lighting activity is paying off.

By the combined efforts of our trade friends and of our own salesmen, 1,304 PL commercial lighting installations were sold in the Duquesne Light service area in 1947. The estimated increased load from these installations is 4,500 kw, the increased EAR, $110,000. Note that these estimates are of increases, that is, amounts above what they would have been without PL effort.

We do know for certain that modern light sources, mistakenly applied just to "cut the light bill," will do exactly that. We know also that such applications do not satisfy the user who soon finds that he made a small money saving at a heavy cost in lighting results and appearance. We have many examples of fluorescent installations that were made in ignorance of the techniques of Planned Lighting. They show decreases varying from 10 to 50% from the former incandescent load. And we know the users are not generally happy with them. Also we have examples of Planned Lighting installations whose owners are greatly pleased with them even though the loads are 150 to 300% of what they were before.

We can point to many beautiful jobs that testify to the success of our Planned Lighting activity. One of them won the Gold Medal Award at the 1947 International Lighting Exposition. Merit Awards went to 18

* Supervisor of Sales Promotion, Commercial Sales Department

of our lighting exposition entries.

Planned Lighting promotion has benefitted both our customers and our company. We are sure of that. This accomplishment did not result simply from hiring men, calling them salesmen, and turning them loose on the customers. Nor did it result from sporadic advertising or a few pep talks to the trade. It resulted from thoughtfully planned effort carried on by trained manpower, aided by consistent use of competent advertising in all forms.

Foundation of our activity is training of salesmen. About 2 years ago we started a continuing training program of sales personnel. Our people have taken the EEI "Basic Sales Training Course" twice and they are reviewed in it from time to time. Technical education in lighting is supplied by the Westinghouse "Fundamentals of Illumination" course and by the General Electric-LaSalle course in illumination. In addition to these formal courses, lighting salesmen attend schools at Nela Park and other instruction meetings arranged by manufacturers. None of our lighting sales personnel is ever graduated from training. He can get a "cum laude" degree in a course, but always there is more organized education in the art ahead of him.

Trade Cooperation

It was realized early that our folks alone could not handle the tremendous potentialities of the commercial lighting market. We needed full cooperation from the trade. These allies were offered the same educational opportunities as company personnel. In 1947, 125 registrants from the trade completed a combination of the EEI, Westinghouse, and General Electric courses. Another 50 registered for the single course on "Fundamentals of Illumination." "Advanced Lighting", given by the League of Western Pennsylvania and the Pittsburgh Chapter of the Illuminating Engineering Society, drew a registration of 114. This work is continuing. So far this year the League is sponsoring another presentation of the EEI basic course.

After the training program was in full swing, advertising and other promotion began. Two customer publications, "Commercial Electric Topics" and "Today's Business," appearing in alternate months, began to emphasize "First Get a Lighting Plan" from our "Man Who Plans." Immediately there came in a large number of return cards asking for the "Man's" services. More requests resulted from several locally designed direct mail pieces. Accompanying this advertising were numerous showings of the Better Light-Better Sight film, "Light Is What You Make It," to service clubs and other groups.

Promotion at Work

When the complete package of promotional material on store lighting became available in the EEI Planned Lighting Program, it was immediately put to work. Mailings of the 12 direct mail pieces are being made on a monthly schedule to some 15,000 accounts. Each of these mailings brings in its quota of prospects. Sales representatives are armed with the store lighting visualizer. Copies of the booklet, "Ever Watch Her as She Passes By" are handed out.

The packages of Planned Lighting promotional material for the office and school markets are now being put to use. All of this adds up to a persistent, insistent reminder to the customer that he should call on the "Man Who Plans" for the best in modern lighting.

In 1947, we received 1425 return cards as the result of our direct mailings. This gave us a prospect list amounting to 7% of our estimated market of 20,000.

As with personnel training, so also in the promotional work is industry cooperation enlisted. Planned Lighting has been the subject of many talks and presentations to group meetings of distributors, contractors, and manufacturers' representatives. Engineering and sales assistance are freely available to any interested persons, firm or organization.

Within the Electric League of Western Pennsylvania a commercial lighting committee has been formed with 27 members from all branches of the local trade. This committee was active in organizing the "Planned Lighting Exposition" held in Pittsburgh, March 1-4, pictures of which illustrate this article. The principal function of the committee is development of a cooperative direct mail program on planned lighting for stores, offices and schools. In this program, the contractors and the manufacturers send appropriate mailings to a common list of accounts on a coordinated schedule. Also the committee will take over sponsorship of training programs for trade personnel.

THIS "PLANNED LIGHTING" INSTALLATION, engineered by Duquesne Light salesmen, won a "Gold Seal Award" at the second International Lighting Exposition

MODERN DEALER STORES spring up all over the Idaho Power Co territory under influence of broad cooperative program

We Make A Bigger Market

RALPH E. GALE
General Sales Manager
Idaho Power Co
Boise, Idaho

Dealer cooperation can include company direct selling to build up low-use customers or to reach farms beyond range where dealers can afford to send salesmen. Rising usage per customer proves soundness of dealer policy

YOU DON'T GET dealer cooperation merely by going out and merchandising. You must set up a program offering and inviting cooperation. And then success will depend on how you operate the program and how sincere you are in cooperating.

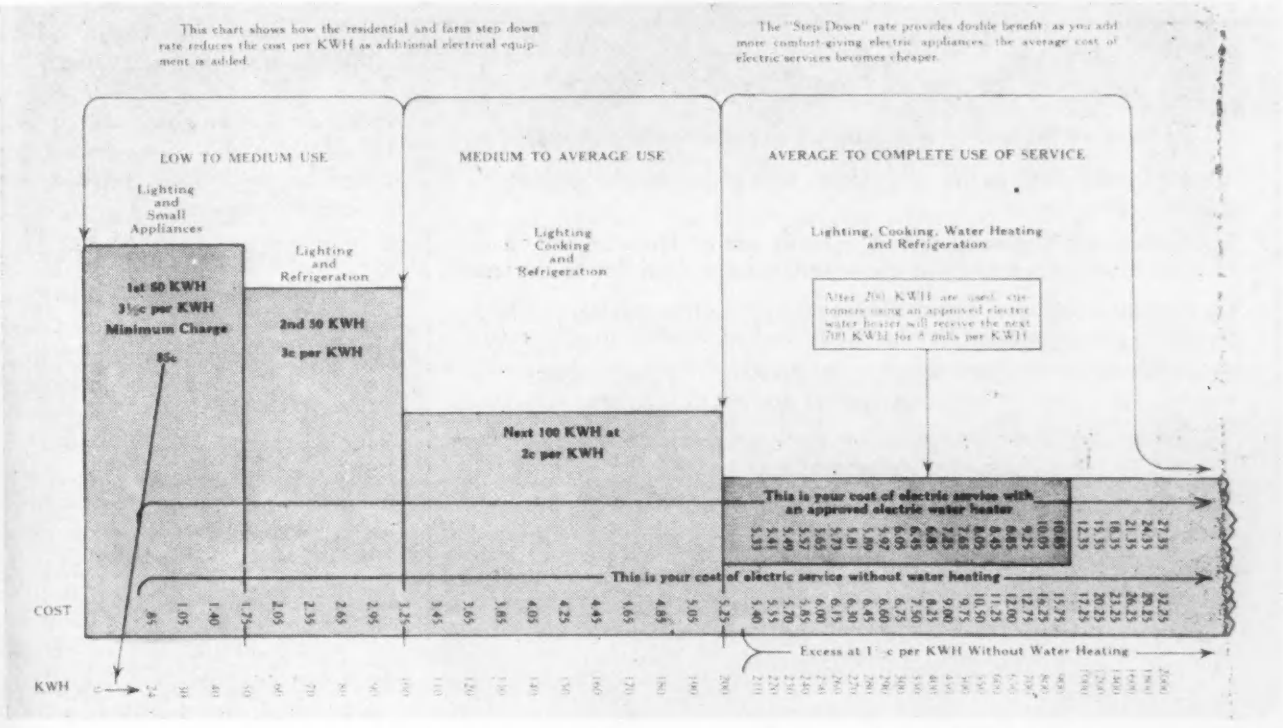
Maybe our case isn't typical; maybe it is. But in our kind of territory, with identical rates for the customers in little towns like Oakley and in denser areas like Pocatello or Boise, we can't live with a high percentage of low-use customers. Maybe some companies have more fat on their ribs than we have. But we know what we need to do in Idaho Power territory. We are sure that our dealers are being told and understand our problem.

We want to help the dealer get every dollar he can. But we can't sit back and let him wait for customers to come in and take the merchandise away. We have salesmen who work on the low-use customers that the dealers won't try to sell, or can't sell.

Some 25,000 of our 80,000 domestic customers still use less than 100 kwhr a month. Zone studies each month show that the proportion tends to increase rather than decrease. Part of our program is to furnish dealers the names of these customers and give them 60 to 90 days before our men go to work. Our salesmen aren't to touch the replacement or the high-use market. That is the dealers' field.

This is our fundamental policy. Let's see what the full program of dealer cooperation is and how it operates. With a background of 32 years in load building, starting with only 17,786 customers in 1916, and entering 1948 with 80,000 domestic customers, the Idaho Power Co has acquired the experience necessary to carry on its well-balanced company and dealer merchandising program.

Practically the only source of income from domestic customers in the early days was from home lighting. The only thing that kept the company in business was management's faith in the future. It was believed that electrically-operated, labor-saving equipment for the home would become generally available and would increase the revenue per customer.


This chart shows how the residential and farm step down rate reduces the cost per KWH as additional electrical equipment is added.
The "Step-Down" rate provides double benefit as you add more comfort-giving electric appliances, the average cost of electric services becomes cheaper.
LOW TO MEDIUM USE
Lighting and Small Appliances
1st 50 KWH
3½c per KWH
Minimum Charge
85c
Lighting and Refrigeration
2nd 50 KWH
3c per KWH
MEDIUM TO AVERAGE USE
Lighting Cooking and Refrigeration
Next 100 KWH at
2c per KWH
AVERAGE TO COMPLETE USE OF SERVICE
Lighting, Cooking, Water Heating and Refrigeration
After 700 KWH are used, customers using an approved electric water heater will receive the next 700 KWH for 5 mills per KWH
This is your cost of electric service with an approved electric water heater
This is your cost of electric service without water heating
Excess at 1½c per KWH Without Water Heating
COST
KWH

GRAPHICAL RATE PRESENTATION, part of utility dealer cooperative program, is effectively used by dealers in promoting sales

For Our Appliance Dealers

There were few electrical dealers in the area served by the company during that period. Therefore, it was the company's responsibility to carry out its own load-building program. This was very necessary, for people were skeptical and each appliance had to be proved before people would accept it. It is significant that not one single electric appliance, with the exception of the radio, received wide public acceptance until it was led by hand through the pioneering stage.

It was not until 1930 that dealers became sufficiently numerous and aggressive to make the company feel it could change its sales efforts, turn part of the responsibility of load-building over to them. In 1930, there were about 100 dealers in the area. But there were still many problems to overcome to be assured of a consistent load-building program. No dealer association had been formed up to this time. But the company worked closely with individual dealers helping them to increase their sales volume. There were many misunderstandings as we tried to coordinate the efforts of so many dealers. Finally in 1934, the Electrical Equipment Sales Association was formed. This organization served as a clearing house for all dealer problems as well as a means of keeping dealers in close contact with company problems. In addition, the EESA instituted a continuous sales training program for dealers throughout the years it functioned. It brought outstanding speakers into the territory for special meetings. It worked with manufacturers, distributors and deal-

DEALERS CAN NOT be expected to reach out to rural areas of this kind. Promotional job must still be carried by power company. Often this means direct sales

Summary of Idaho Power Co Sales Policy

To promote the sale of merchandise by dealers, the company:

Displays appliances on its sales floors with placards giving dealers' names and addresses

Maintains a staff of home service advisors and of domestic and commercial sales representatives whose services are available to dealers

Carries on newspaper, direct mail, radio, and other advertising and publicity promoting use of electricity and of electrical appliances

Furnishes sales information, data on costs of appliance operation, electric rate applications, and market surveys to dealers

Sets up quotas of energy use and revenue for company service areas aimed towards uniform development of service use

Puts its own sales department to work in areas where dealers are unable to develop business up to quotas

Sells merchandise in such areas at prices and on terms that any dealer can meet without sacrifice of profit

ers alike to bring all those identified with the industry closer together in better understanding of each other's problems. The EESA was the pioneer dealers' organization and served its purpose well throughout the years it functioned. When war was declared in 1941, the association was discontinued. From all present indications there is no need for reorganization. Distributors, manufacturers, other organizations and dealers themselves are carrying out the principles that were set up by EESA.

The company's present dealer policy has been in effect without change for the past several years. (See panel above.) The number of dealers has now grown to approximately 600. This includes all classes of dealers, such as hardware, drug and other stores that handle a few appliances and lamps. Dealers now make nearly 100% of all merchandise sales in the territory.

Strong Dealer Organizations

Since the war, manufacturers and distributors have built up such strong dealer organizations that, rather than revive the EESA, the company is cooperating continually with these distributors and manufacturers to promote and present helpful information in their meetings. The company takes traveling shows over the territory and works out campaign promotions, window displays, fair displays and newspaper and radio advertising that will increase dealer sales volume. A typical example is the recent lamp globe campaign.

Sales by Company Employees

Up to 1941, the company carried on an annual lamp globe campaign in which all of the selling was done by company employees. This activity always showed a tremendous increase in volume year by year. It was the general opinion that this was one job that would always require 100% company operation. During the war years, this activity was dropped. It was not revived until the fall of 1947, when it was decided to make this a 100% dealer activity. The first step was to call a meeting of lamp globe distributors and their field representatives. We explained our plan and asked each one if he wished to participate. We were assured of everyone's willingness to do so.

Our plan included many promotional aids that were furnished by the company. Among these were door stickers; pin-up cards for counters and telephone; and bill stuffers.

Program of newspaper and radio advertising was set-up throughout the campaign. Distributors aided the dealers with window, floor, and counter displays and assured all dealers of ample stocks of globes.

Results were very gratifying. The volume of business done in this activity far out-weighed any previous lamp campaign. Final results produced about a 70% increase over sales in the same period in 1946.

Chart-talk Prepared

A program in progress at the present time is a specially prepared chart-talk given at distributor-dealer meetings by a company representative. The talk covers the company's load-building progress. Beginning with 100% company sales in 1916, it gradually shows how the merchandising picture completely reversed to nearly 100% dealer sales in 1948. It points out to dealers why it was, and still is, necessary for the utility constantly to build load. It also covers how rates can be used as a selling tool.

The chart shown here is given to each dealer in attendance. It explains the step-down features of the rate and how little it costs for increased use of service. The dealers are anxious to receive this type of information. We emphasize the low-use group as the great potential market for major equipment. We call to the dealers' attention the replacement market for ranges and water heaters which has accumulated to about 18,000 prospects. This market becomes important when saturation has reached 50% or better, as it has in this area. We also tell them of the 20,000 new customers that will be added to our lines within the next 5 years, making a total of some 60,000 prospects in all for major equipment.

Anticipated Goals

It is estimated that the average volume in merchandise sales will reach between $80 and $90 per customer during 1948. Electrical dealers will get practically all of this money.

Kilowatthour use per customer reached 3,409 in 1947. It is estimated that it will reach the 3,800 mark at the close of 1948.

The company also assists the electrical contractors and the electrical inspectors in the area. Harmony between all branches of the electrical industry in Idaho, we believe, is the proof that these policies are sound and make more business to share.

Single-Sideband Carrier Telephone Gives High Voice Quality

F. S. BEALE
Industrial Electronics Division
Westinghouse Electric Corp
Baltimore, Md.

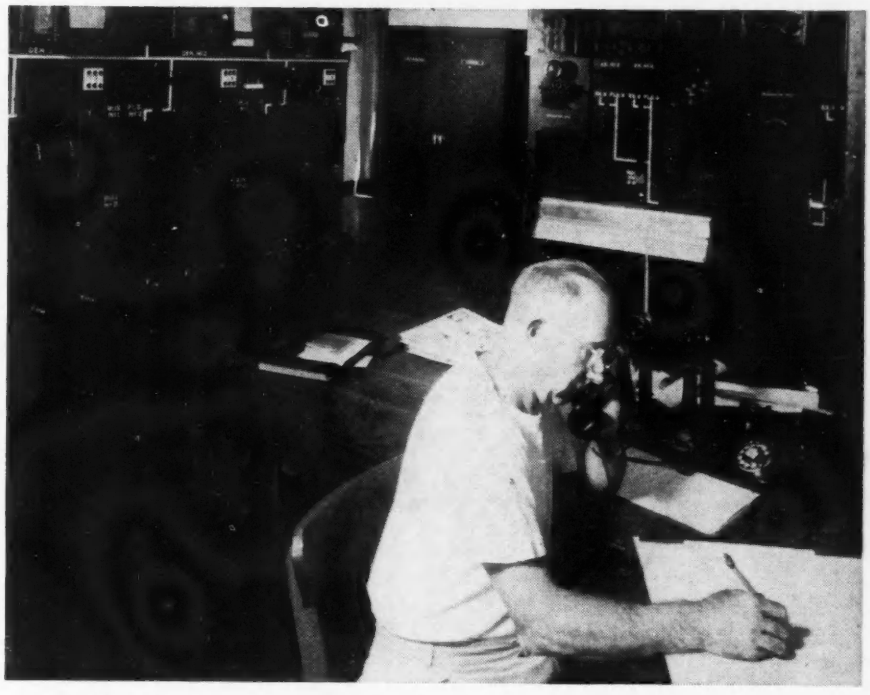
New principle used in single-sideband power line carrier. More channels opened up by simplified suppression of both carrier and opposite sideband

THE FIRST TWO sets of the new Westinghouse single-sideband power-line carrier equipment went into service recently. These provide a high-quality telephone circuit between Portland, Oregon, and Pasco, Washington, over 262 miles of power lines of the Pacific Power & Light Company. This channel is also used in cascade with another channel that connects Pasco with Spokane, thus providing direct communication between Portland and Spokane. These new services fill an important need in the Northwest Power Pool.

The new single-sideband carrier system is unique because it does not depend on filters for the elimination of the undesired sideband. As in older single-sideband equipment, balanced modulator circuits suppress the carrier. However, copper-oxide ring modulators, provided with a method of balancing, are used in place of vacuum tubes. Elimination of the undesired sideband is accomplished by using two sets of modulator circuits, each supplied with carrier and audio-frequency signals. But, the carrier signals supplied to each modulator circuit are 90 deg out of phase with each other. Similarly the audio signals are supplied to each modulator, but are 90 deg out of phase with each other.

Basic schematic arrangement of circuit elements for the single-sideband system are shown in Fig 1. Source of the carrier signal is a very stable oscillator, maintaining the desired carrier frequency within 10 cycles of the assigned value. The source of the audio signal is the telephone instrument, with or without line or amplifier. Modulators "A" and "B" combine their respective input signals as shown by the vector diagrams of Fig 2; output "a" in Fig 1 containing upper and lower sidebands having the vector relationship of Fig 2 (a), and similarly with "b" and (b). By proper electrical connection of these output circuits the vector relationship at (c) results, and the upper sideband products only are delivered to the carrier frequency amplifier or channel.

The carrier channel between Portland and Pasco is operated on the



OPERATOR using new single-sideband telephone carrier between Portland, Ore., and Pasco, Wash., over 262 miles of power lines. Carrier equipment is in center background

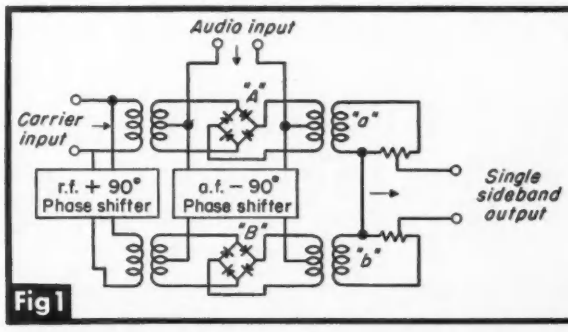


Fig 1

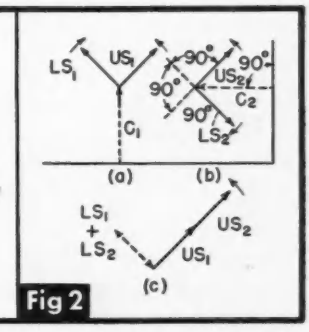
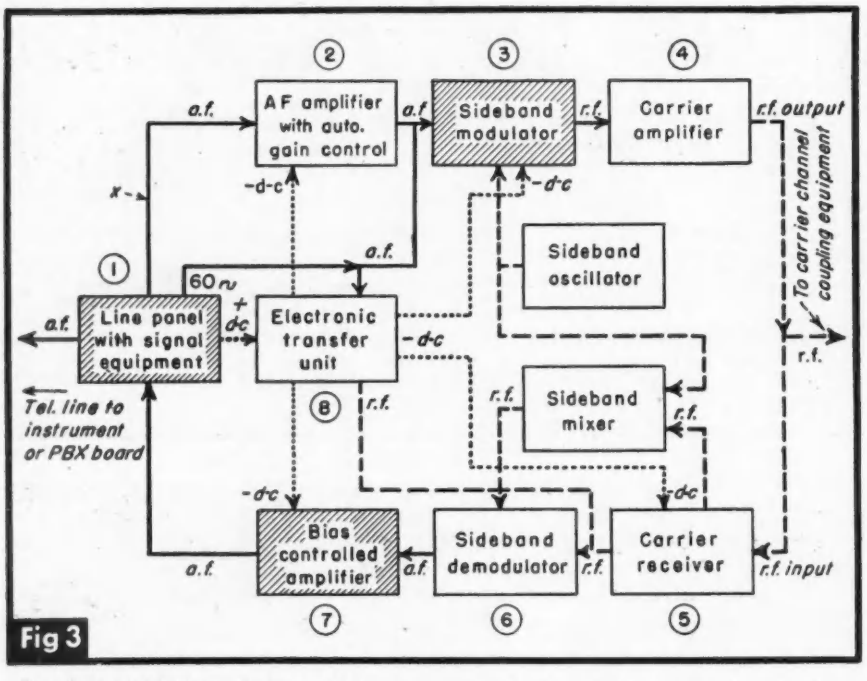


Fig 2

BASIC SCHEMATIC for suppression of carrier and delivery of only one sideband from output circuit (Fig 1). Vector diagrams (Fig 2) showing method by which scheme shown in Fig 1 functions



BLOCK DIAGRAM of single sideband automatic simplex (single frequency) power line carrier equipment using super-heterodyne receiver

single-frequency basis (91.4kc). That is, all transmitters and receivers are tuned to the same frequency. Operation is entirely automatic under the voice-control of an electronic transfer unit at each station. This particular unit is a new development.

Connection of the hi-line telephone circuit at Pasco was desired in order to establish a quick and convenient circuit between an office in Kennewick, near Pasco, and the Portland office. The 60-cycle induction noise on this line was severe enough to cause false operation of the 60-cycle code signalling equipment during speech. This difficulty was overcome completely by using a bandpass audio filter which passes only the essential speech frequencies in the 300 to 3,000 cycle range. This filter was connected into the audio input circuit at "X" in Fig 3.

Equipment Unit Operation

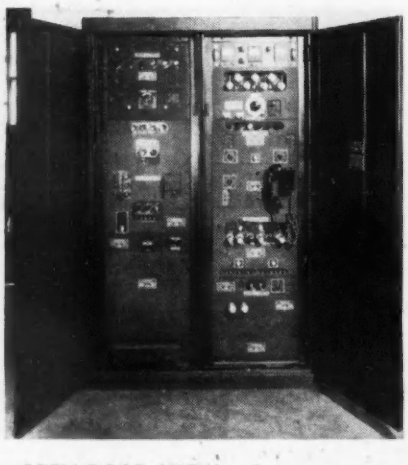
The block diagram of Fig. 3 illustrates the arrangement of the equipment units used in this assembly. Speech signals from the telephone line pass through units 1, 2, 3, and 4, and thus are delivered to the carrier channel as the upper sideband products of the modulation performed in 3. Carrier signals received from the carrier channel pass through 5, 6, 7 and 1 to reach the telephone line, being demodulated in 6. Obviously, because of the use of a single frequency, the receiver (5) is tuned to the same carrier frequency as are the sideband oscillator and carrier amplifier. Thus it is seen there is a "closed path" or "loop" for a signal entering unit 1; that is, from 1, through 2, 3, 4, 5, 6 and 7 back to 1. To prevent howling due to feedback, grid bias blocking of units 3 and 7 is a normal condition in the absence of signal from either the telephone line or carrier channel.

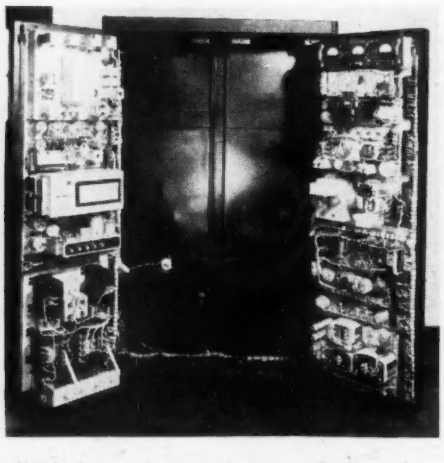
Telephone Line Signal

When a signal arrives from the telephone line it flows through 2, 3 and 4 and is delivered to the carrier channel because 8 receives the same signal, and is arranged to remove the blocking voltage from 3 after it has applied another blocking voltage to 5. The latter is done to prevent the receiver from delivering a control signal to 8. When the telephone line signal stops, the equipment immediately returns to the normal condition.

A signal arriving from the carrier channel delivers its output to 6 and 8. The latter immediately blocks 2 and removes the blocking voltage from 7. Thus the audio signal output of 6 is then delivered by 7 to 1 and the telephone line; it also delivers some signal to 2, but this unit is blocked, so that no output can reach 8 to cause trouble. Again, when the carrier channel signal stops, the equipment returns to the normal operating condition.

Major advantages of the single-sideband over the common AM double sideband or FM carrier is that it utilizes a waveband less than half the width that formerly required. This makes possible materially increasing the number of channels in a given frequency range. Since utilities have been assigned only the range from 50 to 150 kc for power-line carrier, the added available channels are a considerable advantage.





OPEN-DOOR VIEW of carrier equipment (left) shows neat appearance made by rack-mounted panel units after assembly in cabinet . . . Equipment rack frames swung open (right) showing arrangement of apparatus and high degree of accessibility

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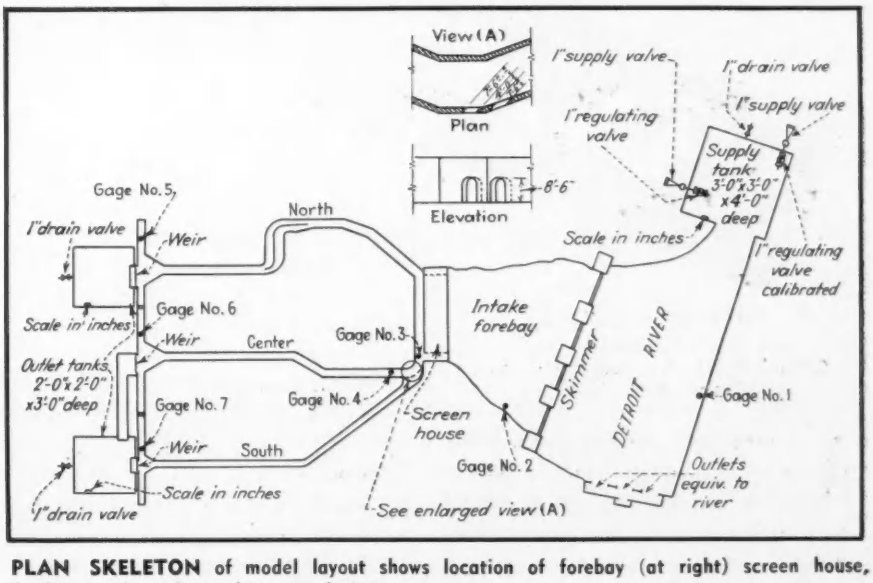
Hydraulic Model Aids Plant Design

JOHN R. JAMES
Senior Civil Engineer
Detroit Edison Co.

HYDRAULIC MODELS on several occasions have proven useful to Detroit Edison Co in connection with the reconstruction and extension of existing steam plants. Models were used 15 years ago when the Conners Creek Plant generating capacity was increased by 2½ times that of the original plant. At the present time, they are being used in connection with problems brought about by increasing the Trenton Channel Plant capacity by an additional 200,000 kw.

These problems arise from the increased demand for condensing cooling water caused by substitution of existing generating units by larger ones or by new units. Under certain conditions there is no question as to the need of additional water conduits. But with borderline situations, a large investment is saved if it can be demonstrated that existing systems will suffice. It was in these cases that the hydraulic model has proven valuable.

MODEL SET UP in screen house at Trenton Station. The three water tanks shown were calibrated so that various operating conditions necessitating from 100,000 to 750,000 gpm could be duplicated for investigation



PLAN SKELETON of model layout shows location of forebay (at right) screen house, feeder canals and canal to circulating pumps

Demand Increased

In increasing the Conners Creek Plant generating capacity by 250%, the cooling water demand was increased over 100%. Making use of a 4-ft. circular intake tunnel that at one time served a temporary 30,000-kw generator plus an abandoned cable trench running lengthwise of the turbine room, a hydraulic model demonstrated that the circulating pumps could be adequately served. It was found that when a high water period occured, all openings into the overflow canal had to be made tight. This was verified by tests run on the hydraulic model. The high water experienced in the Detroit River early this fall has further substantiated the results found with the model.

Since existing structures for satisfying the increased water demand were used, the friction losses were found to be considerably higher. This resulted in more auxiliary power expenditure because of the higher pumping head on the circulating pumps. However, this charge was far less than the cost of financing the investment in a new intake and overflow canal. The model was also helpful in selling the soundness of the basic idea to management.

At the present time, a similar problem is presented at the Trenton Channel Plant. This station's 300,000-kw capacity will, within the next two or three years, be increased by 200,000-kw. Cooling water requirements will be increased by 200,000 gpm or 446 cfs. A new intake and overflow canal will serve these units.

Here, the situation at the screen

Water Equivalents

Calibration of Supply and Outlet Tanks

Plant Vol, gpm	Model Equiv., gpm	Model Equiv., cfm	Supply Tank Height, in.	Outlet Tank Height, in.
100,000	6-1/4	0.835	1.20	2.496
150,000	9-3/8	1.260	1.67	3.756
200,000	12-1/2	1.670	2.23	4.992
300,000	18-3/4	2.515	3.35	7.500
450,000	28-1/8	3.775	5.02	11.256
550,000	34-3/8	4.610	6.14	13.752
600,000	37-1/2	5.030	6.70	15.000
650,000	40-5/8	5.445	7.26	16.248
750,000	46-7/8	7.280	8.37	18.744

house presents a problem. The screen house was originally designed for 18 screens. But the operating department had found that 15 screens proved satisfactory. There is a canal at each end of the screen house that runs to the turbine room. Each canal serves three 50,000-kw units. The new extension will also require a canal. Thus, there will be two canals at one end of screen house drawing over 1,000 cfs, and one canal at the far end drawing about 600 cfs. The following questions present themselves: (1) Will velocities through the screens near end of the screen house with two canals be excessive? (2) What will be the depth of the water over suction pipes for all units? (3) Where is the best location for joining the new canal to the present construction?

All three have been satisfactorily answered by tests. After reviewing the reading of water levels in the model under various operating conditions, it was decided to continue to operate with the 15 screens. The depth of water over the suction pipes was satisfactory. The connection for the new canal was located so that it would cause the least disturbance to the stream line flow in the elbow of the center canal leaving the screen house.

The model used is made to a scale of $\frac{1}{4}$ in. to the foot. Its linear dimensions are 1/48 of its prototype. The velocities used vary as the square root of 48 and the volume varies as the square root of the fifth power of 48. Maximum water requirements of the model are 750,000 gal (the maximum demand for present plant plus extension) divided by the fifth root of 48 squared equals 46–7/8 gpm.

Sand fillings were used in the forebay to simulate existing conditions established by soundings. Screens were made of window screening material. The model was made of white pine and painted with bitumastic solution. Lining with linoleum will give equally good results.

32 High School Seniors

HARRIS E. DEXTER
Vice President
Central Hudson Gas and Electric Corp
Poughkeepsie, N. Y.

AT LEAST ONE electric utility is spending time and money on the problem of attracting high school boys to a career in the power business.

That is the Central Hudson Gas and Electric Corp, of Poughkeepsie, N. Y. Next summer it will conduct three indoctrination courses for a selected group of high-school seniors. One of them will be awarded a four-year scholarship to Rensselaer Polytechnic Institute.

Central Hudson's aim is "to aid the company in obtaining a supply of high-grade personnel to maintain its present organization and to provide for the company's growth."

From each of the 32 high schools in Central Hudson's area, one boy will be selected.

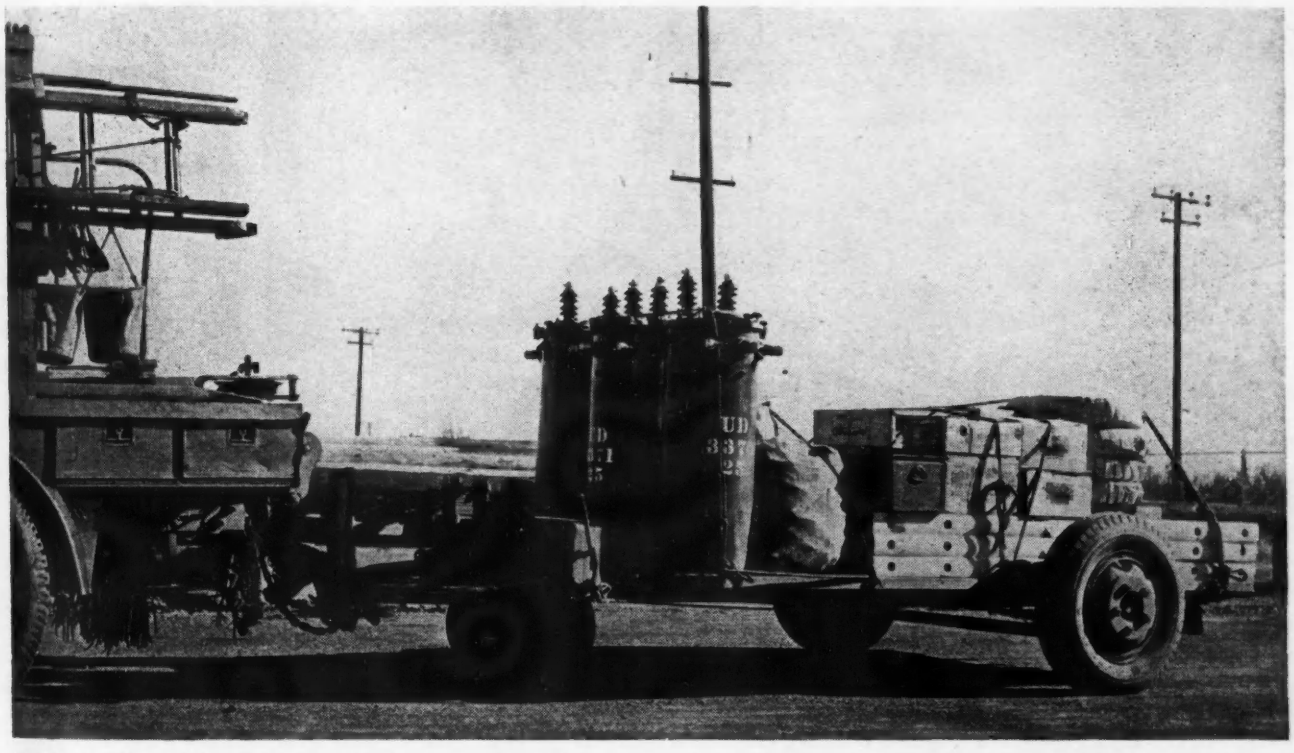
Selection among the applicants at each school will depend primarily upon the school principal, subject to Central Hudson acceptance. It will be based on academic standing, personality, leadership qualities and ability to get along with others.

The indoctrination course will consist of three three-week sessions. About 10 boys will be enrolled in each. The courses will attempt to acquaint the candidates with all phases of the company's business. Students will be assigned to different locations on the system, Monday through Friday and they will be paid $25 weekly.

Part of the time will be spent on examinations to develop what they are getting out of the course. Each candidate must agree to write an essay on what he learned when the course is finished.

The Rensselaer scholarship, to be available in the fall of 1949 to a member of the 1948 course, will be good for $600 yearly through four years. The holder will be required to maintain grades satisfactory to the Institute. He will be chosen by R. P. I's. dean of engineering, a member of the local AIEE chapter and the company. Central Hudson will have a final veto. The holder is guaranteed employment with the company each summer he is in college and that before he enters. There is no commitment upon either Central Hudson or the scholarship holder regarding employment after college graduation.

HOW TO DESIGN • CONSTRUCT OPERATE • MAINTAIN



WAR-SURPLUS BOMB-TRAILER loaded with quantity of material for large line job saves time lost, by practically unloading line truck upon arrival on the job where material is carried on the truck in customary manner

Bomb Trailers Excellent for Material Transport

CARL L. RICHEY
Ass't to General Manager,
Sacramento Municipal Utility District,
Sacramento, Calif.

SOLUTION TO THE problem of transporting materials for large line jobs has been found by the Sacramento Municipal Utility District through use of war-surplus bomb trailers.

A pallet handled by a fork lift is not big enough to hold materials for more than a several-pole extension job. Materials for extensive jobs, if loaded on a line truck, can mean practically unloading the truck upon arrival on the job. At the end of the day, materials not used must be reloaded on the truck. All these operations quite naturally mean lost time.

Trailers have also been very useful in hauling transformer banks to the job, e.g. three 75-kva or three 50-kva transformers. It is a simple matter to spot the trailers for ready hoisting of the transformers.

It is planned further to use one of these trailers to mount a transformer bank to maintain service while a permanent bank is being worked on. A suitably protective screen would be placed around transformers on these "mobile substations," in thi sparticular case.

Bomb Trailers Are Used

Trailers being used are 2½-ton bomb trailers with 7.50 x 18 pneumatic tires, dual-wheel front caster, and a platform body 68 in. x 135 in. They were modified only to the extent of removing the bomb racks and fusing compartment (see picture above).

Savings Result

These trailers have proven very satisfactory in handling many of the materials that are required to be used on large jobs. Considerable savings have resulted by using these trailers.

The initial cost was far below that of the nearest adaptable commercial equipment. In many respects the trailers are more readily useful than much of the regular utility equipment that is already available to the utility companies and to other purchasers of equipment on the market.

power substations had to

3 LOAD-CENTER UNITS WENT THERE SAFELY AND ECONOMICALLY

The roof was the ideal spot for the substations at Plant No. 6 of the Campbell, Wyant and Cannon Foundry Company.

Installed there, these three 1000-kva G-E load-center units paid top dividends right from the start—by eliminating the long, costly heavy-copper secondaries required by an alternative method.

They first caught the practical eye of the plant engineers because they *could* be installed there, safely and economically. Co-ordinated unit substations—with metal-enclosed switchgear and Pyranol Transformers—made it possible.

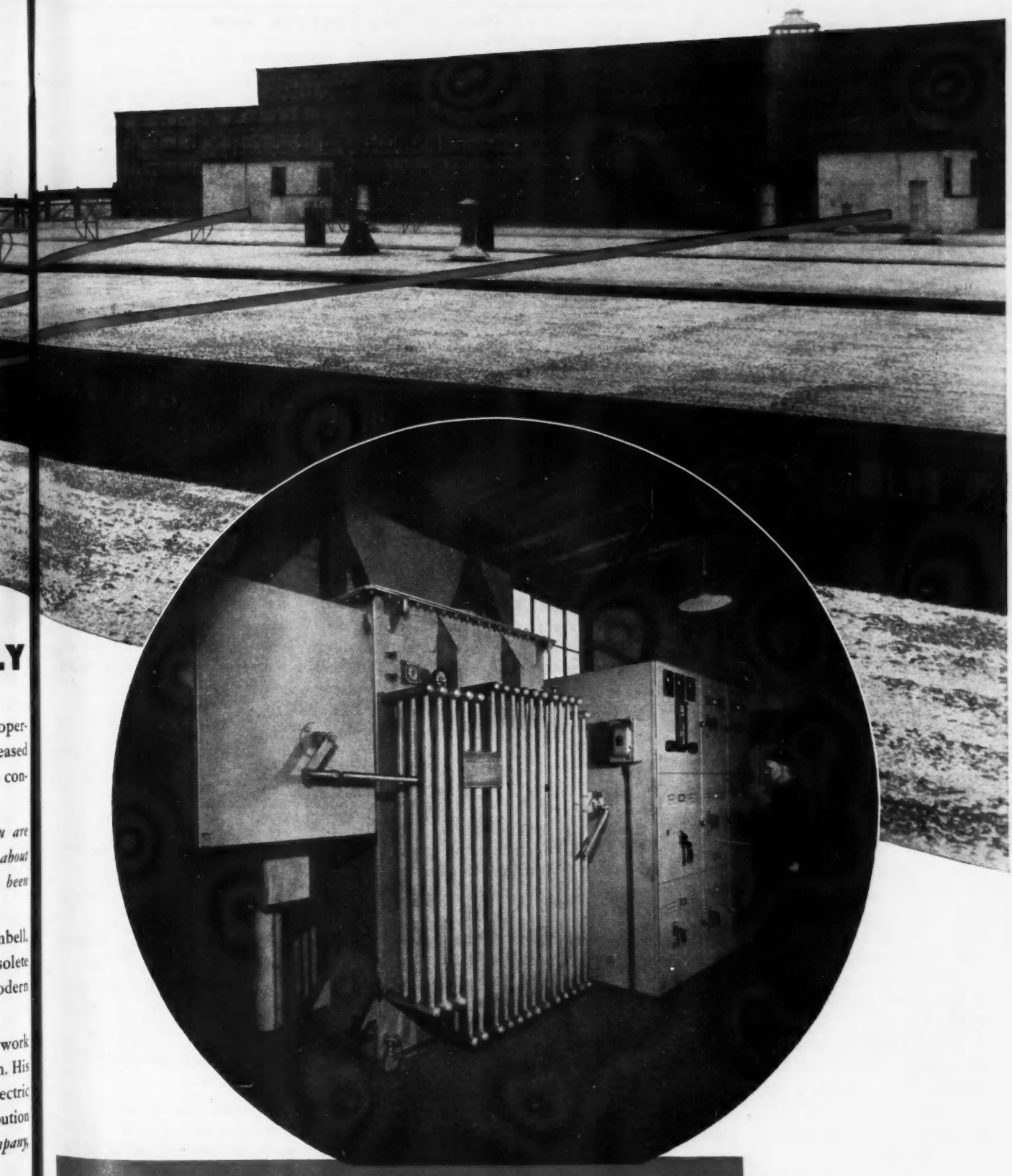
Along with these three units, two other G-E load-center unit substations—a 750- and a 1000-kva unit—went in Plants 1 and 3, replacing outgrown open-type equipment of inadequate interrupting capacity. The Electrical Superintendent reports that all the new units have been easy and economical to install, operate and maintain. Most of all, he values the increased protection they afford, both to personnel and to continuous plant production.

"You can haul them in, hook them up and you are ready to start," he says. "Then you can forget about them. Our confidence in these unit substations has been substantiated by their record on the job."

In fact, a modernization program at the Cambell, Wyant and Cannon Company calls for all obsolete distribution equipment to be replaced with modern unit substations of increased capacity.

Your G-E sales representative will be glad to work with you on your next plant distribution problem. His recommendations will be based on General Electric experience with thousands of load-center distribution systems. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

to go on the ROOF!



GENERAL ELECTRIC

321-49

Table Shortens Voltage Drop Calculations

CHARLES C. HOKE
Engineer
Union Electric Co of Missouri
St. Louis, Missouri

A TABLE FOR quickly determining the percentage voltage drop on 7200/12470 and 2400/4160 v primaries has been developed and is becoming increasingly valuable in the rush of figuring new work. It utilizes only three terms: miles of line or thousands of feet of line read directly from a map; meggavoltamperes and a constant. It is applicable to 3-phase, single phase and circuits having both.

Two problems recently encountered demonstrate its flexibility.

1. It was desired to serve a 400-kva 3-phase load over a 10-mile 7,200/12,470 ACSR line. Primary voltage drop was not to exceed 3%. From table values it was found that drop using No. 2 would be 10 x .400 x 0.903 or 3.6%. Since this was too great, similar calculations using No. 1 (10 x .400 x 0.645 or 2.6%) quickly show it to be adequate.

2. A quick check was needed to determine what the voltage drop would be if a single phase No. 4 ACSR 8-mile branch line was to carry an evenly divided load (100-kva average). This was to be supplied by a 3-phase No. 1/0 ACSR feeder 7 mi long. The latter has a balanced 3-phase load of 800-kva at the beginning of the feeder dropping to 700-kva at the point of single phase take-off.

Maximum voltage drop would have been

$$\left(7 \times \frac{.800 + .700}{2} \times .645\right) + \left(8 \times \frac{.200 + 0}{2} \times 5.98\right) \text{ or}$$

(93.33% on the 3-phase and 4.78% on the single phase or a total of 8.16%. Since this was too large and quick figures were needed, these steps also save time.

What would drop be if single phase were changed to No. 1/0? Getting relationship of constants from the table and multiple by the drop using No. 4, $\left(\frac{2.92}{5.90} \times 4.78\right)$ or 2.34% drop would result.

What would result be if served by 3-phase No. 4 ACSR? Again, from the table, $\frac{1.33}{5.98} \times 4.78$ or 1.06%.

The words "maximum voltage drop" are used advisedly since the actual drop may be somewhat less on loads with certain power factors. Standard spacing of wires was taken into consideration in determining the constants.

PRIMARY LINE VOLTAGE DROP

WIRE SIZE ACSR	WIRE SIZE CU	VOLTAGE	PERCENT VOLTAGE DROP SINGLE PHASE			PERCENT VOLTAGE DROP THREE PHASE		
3/0	1/0	7200/12470	(Miles)	(MVA)	(2.31)	(Miles)	(MVA)	(.512)
1/0	2	" "	"	"	(2.92)	"	"	(.645)
2	4	" "	"	"	(4.07)	"	"	(.903)
4	6	" "	"	"	(5.98)	"	"	(1.33)
3/0	1/0	7200/12470	(M Ft)	(MVA)	(-42)	(M Ft)	(MVA)	(.097)
1/0	2	" "	"	"	(-54)	"	"	(.122)
2	4	" "	"	"	(-75)	"	"	(.171)
4	6	" "	"	"	(1-1)	"	"	(.252)
3/0	1/0	2400/4160	(Miles)	(MVA)	(19.9)	(Miles)	(MVA)	(4.40)
1/0	2	" "	"	"	(25.1)	"	"	(5.55)
2	4	" "	"	"	(35.0)	"	"	(7.77)
4	6	" "	"	"	(51.4)	"	"	(11.42)
3/0	1/0	2400/4160	(M Ft)	(MVA)	(3.61)	(M Ft)	(MVA)	(.834)
1/0	2	" "	"	"	(4.64)	"	"	(1.05)
2	4	" "	"	"	(6.45)	"	"	(1.47)
4	6	" "	"	"	(9.46)	"	"	(2.16)

• • •

18 Don'ts When Working on Oil Circuit Breakers

A SERIES OF ITEMS to be observed prior to, during and on completion of inspection of oil circuit breakers, have been compiled in a manual on station electrical maintenance. The items have been listed and phrased for the electricians in the Power Dept of the West Penn Power Co, Pittsburgh, Pa.

1—Don't forget to obtain a release on the breaker before working on it. Climbing onto an energized breaker means death.

2—Don't forget the barriers, guide ropes, or tape.

3—Don't leave tools, ladders, etc, in tanks when returning the breaker to service.

4—Don't forget to ground the leads before working on inside of breaker and don't forget to remove grounds before closing breaker disconnects.

5—Don't forget to remove the current links to the bus differential or bus overload protection before working on the current transformers of the breaker; otherwise there may be a bus differential operation. Conversely, be sure to replace these links or it is only a matter of time until there will be a bus relay operation.

6—If the various adjustments of the breaker are O.K. as found, don't monkey with them.

7—Don't force a mechanism that does not operate freely. Inspect it to determine the trouble.

8—Don't permit the toggles to move to dead center; such a condition will prevent the breaker from tripping.

9—Don't let moisture get into any oil samples.

10—Don't forget to check the oil level before leaving the job.

11—Don't forget to inspect all gaskets.

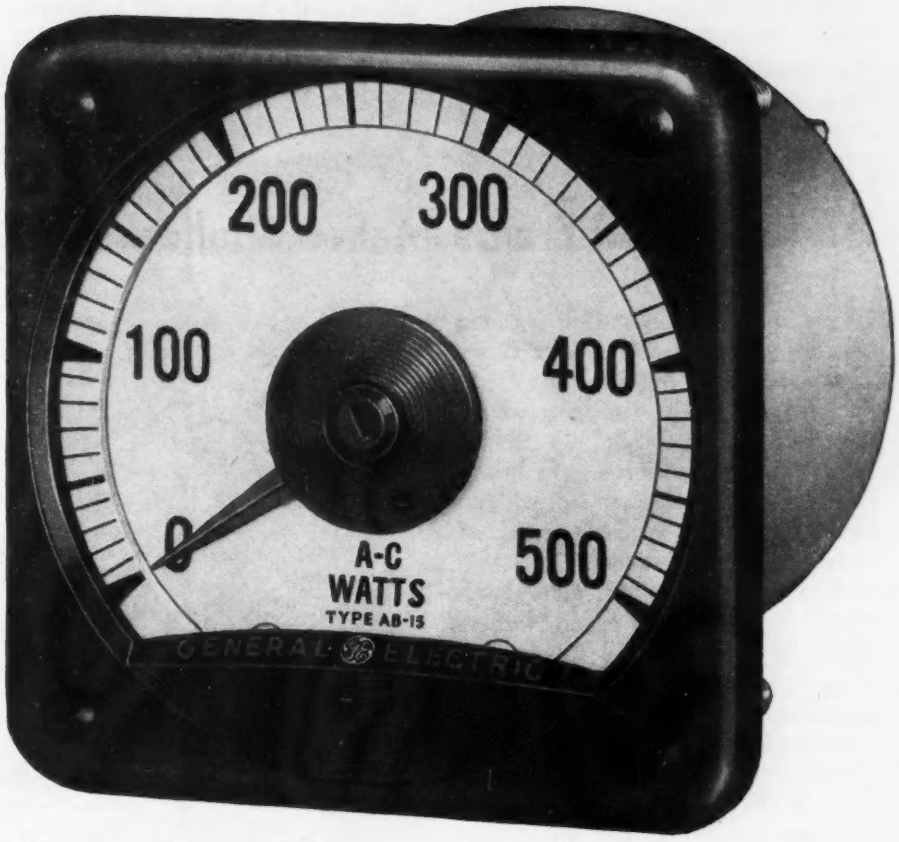
12—Don't forget to tighten all covers and bolted connections. These prevent the entrance of moisture.

13—Don't use penetrating oil as a permanent lubricant.

14—Don't forget to lubricate the bearing surfaces with a good quality of oil, such as Graphoil, or to put a thin coat of grease, such as No-Ox-Id, on latch faces.

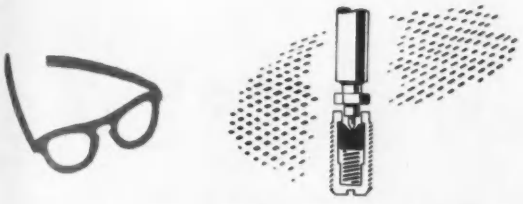
15—Don't place bushing under stress when connecting leads.

16—Don't operate the breaker by the

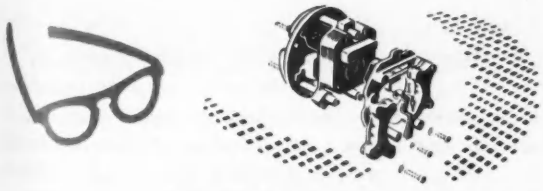


GREATER STRENGTH

FOR EASE AND ECONOMY OF SERVICE



STURDINESS—Jewels spring mounted to minimize possibility of accidental damage to pivots.



EASE AND ECONOMY OF SERVICING assured by new "unit" design . . . entire moving-element assembly can be removed without disturbing calibration.

OTHER POPULAR FEATURES OF THE NEW LONG SCALE LINE ARE—

Reduction of behind-the-panel depth . . . potential circuit resistance built within the instrument in most instances. *Economy of space* . . . small size—only 4¼ inches square—permits mounting of five instruments side-by-side on a panel only 24 inches wide. *1-per-cent accuracy* . . . antiparallax scale and pointer plus antiglare glass permit readings from any reasonable distance or angle.

And those are only a few of the features available to you in these new instruments. Couple them with the many other refinements found in all G-E switchboard instruments and you have a line unexcelled in quality and performance . . . instruments that will do the job better, quicker, and more efficiently.

When you need switchgear or additional switchboard instruments, *insist* on the G-E long-scale line and be *sure* of the best. Ask your nearest G-E sales office for complete information on these AB-15 (a-c) and DB-15 (d-c) instruments. . .

A-c Ammeter	**A-c Voltmeter**	**A-c Wattmeter**
Varmeter	**Power-factor Meter**	**Frequency Meter**
Synchroscope	**D-c Ammeter**	**D-c Voltmeter**

Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

*Reg. U.S. Pat. Off.

GENERAL ELECTRIC

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solenoid when the oil tanks are lowered unless it is absolutely necessary.

17—Don't forget to remove all film and scum from breaker contacts; otherwise the breaker will soon overheat.

18—Don't forget your "safety first." There is a tendency to overstress safety just after a serious accident and then, as time goes by, to become lax. That is a good time for another accident to occur.

• • •

Wood Frame Makes Shallow Meter Box Deeper

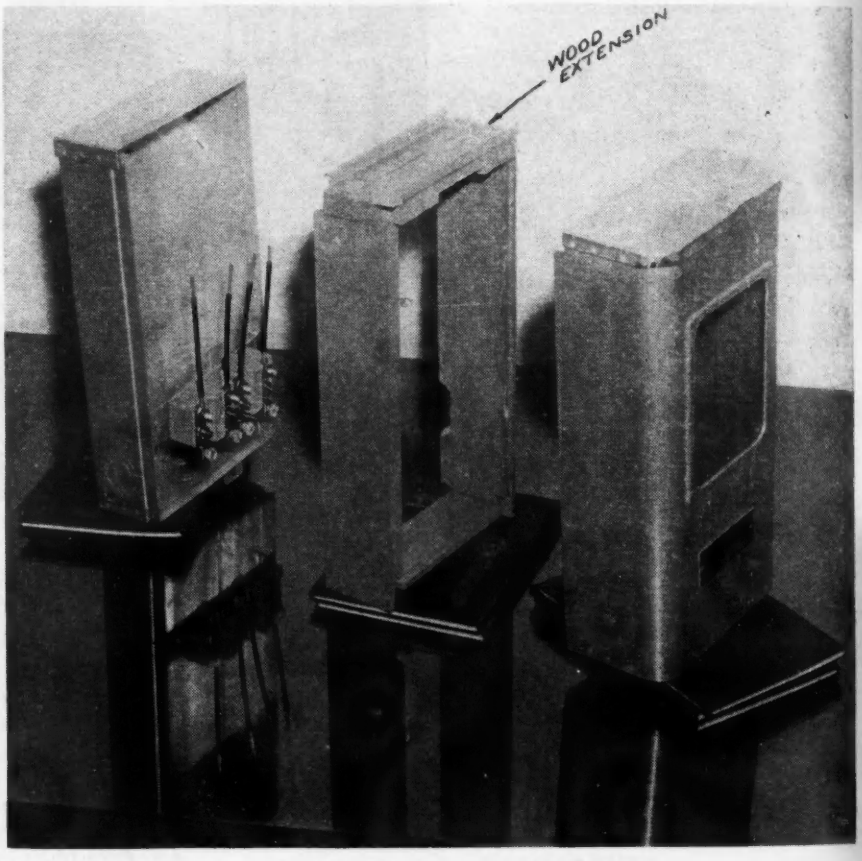
A WOOD FRAME extension used on shallow outdoor metal meter boxes is making it possible for Public Service of Northern Illinois to circumvent the deep box shortage. In fact, it made it possible to serve water heater and demand metered services without reverting to the former practice of installing meters indoors.

The wood extension frame, developed by John P. Bourg and Norman Flynn of the company's Joliet meter department, is machined as shown in the accompanying exploded photograph. It is made of soft lumber. When made in quantities, each unit costs $1.05.

When converting a shallow box, the frame is hooked over the lip of the back pan and pressed down so that the sides fit into the grooves. The cover is then put into position by hooking it over the lip provided on the frame. It, too, is pressed down to slide into the grooves.

Tampering is prevented by using a bar, a chain and padlock, or two wire seals. More than 5,700 installations of this type have been made to date on time switch meters, IM-30-A demand meters and others requiring extra deep covers. Experience has been so satisfactory that, even when deep covers again become readily available, these will not be changed until the box becomes damaged or there is a change in wiring.

WOOD EXTENSION FRAME, being fitted by J. P. Bourg and N. Flynn, between back pan and box cover.



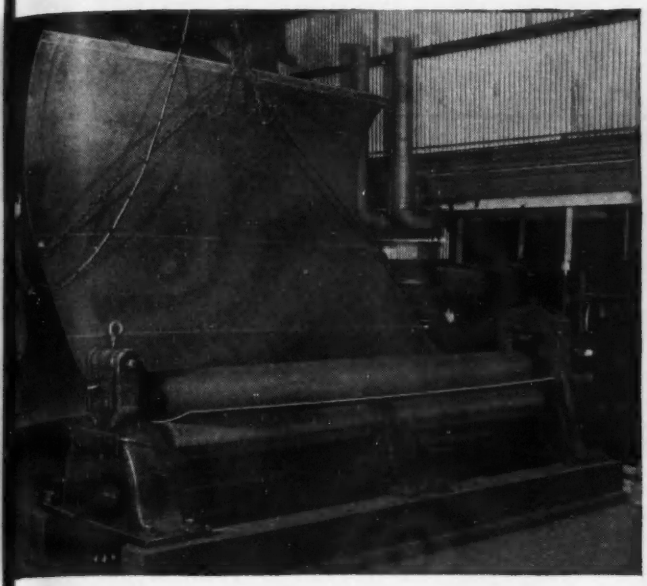
DEVELOPERS completing one of the trim, tamper-proof installations

Series Capacitors For Western Line

SPECIFICATIONS FOR AN installation of series capacitors for line compensation on a 220-kv single circuit transmission line are being prepared by engineers of a west-coast city department of water and power.

Capacitors are not required for the 260-mi line from Owens River Gorge in the Sierra to deliver its rated 100,000 kw. The proposed installation of 5,000 kva on this line will be made primarily to obtain experience with operation of control equipment necessary for protection during short circuit conditions. Although series capacitors would normally be installed at the middle of a long line, this installation will be made at the lower end where it may be tested and watched carefully.

Line compensation with capacitors is one method proposed to allow design and operation of lines up to 500 mi. long, which would otherwise be economically unfeasible at present common transmission voltages. Operation of this equipment will allow investigation of technical problems that may arise in application of series capacitors. It is hoped it will prove or disprove the merits of the proposed method for protection of the capacitors, and verify the feasibility of quickly inserting them back in the circuit after removal during fault conditions.

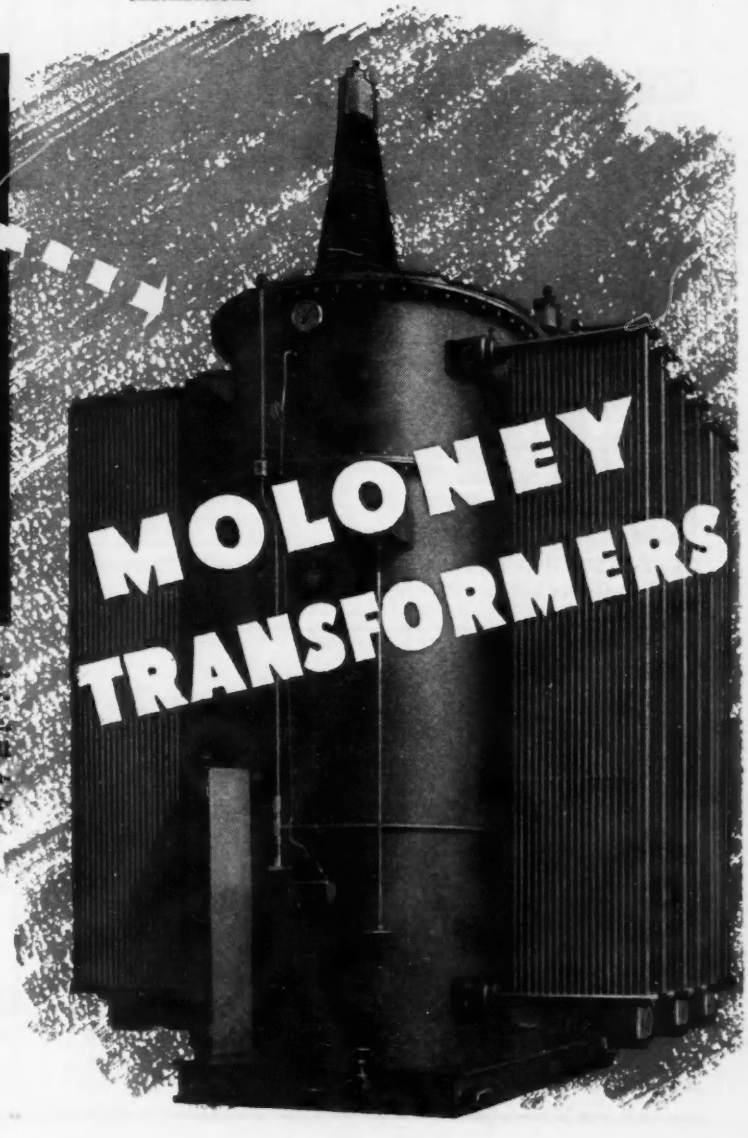


Here we see steel being rolled to form a section of the tank wall. The workman is operating the overhead electric crane holding the steel while the rolls operated by another workman curve the steel plate according to the layout man's markings. As this operation progresses, it is checked again and again until the exact shape specified is obtained.

3

After shaping, the tank sections are welded together by means of automatic seam welders. The seams are welded both on the inside and outside. Shown here is the inside seam welding operation. After this, heavy steel angles or Z bars are welded to the tank wall to provide reinforcement, enabling tank to withstand, without distortion, pressure of the cooling oil and stresses encountered in shipment and installation.

Shown here is the final inspection of the transformer tank. Every welded seam, and every connection point is thoroughly examined for possible leaks under air pressure. The inspector is covering the seams with a liquid which will indicate even the most minute leak. After this careful inspection the tank is completely sand blasted and then painted before the core-and-coil assembly is installed.



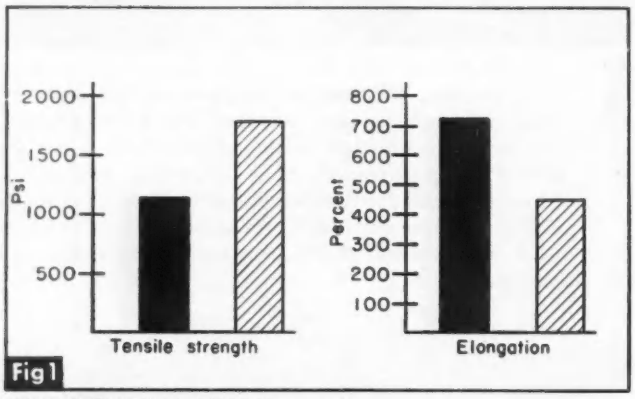
LECTRIC COMPANY

SSOURI AND TORONTO, ONTARIO, CANADA.

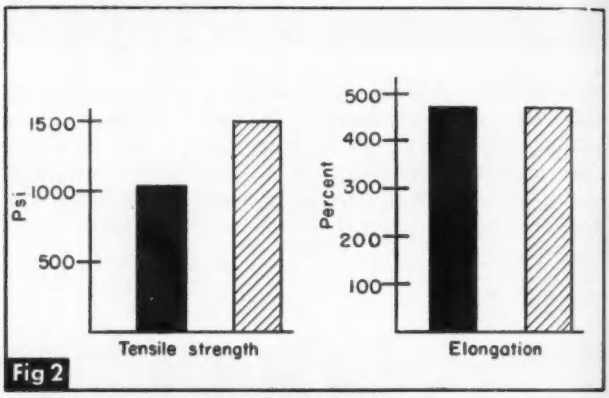
Insulation Properties of Buna S And Natural Rubber

Charts show relative properties of both heat-resistant grade and performance grade Buna S (GR-S) rubber for control cable insulation. Properties of comparable natural rubber compounds are also shown. Solid black bars represent GR-S rubber; hatched bars represent natural rubber

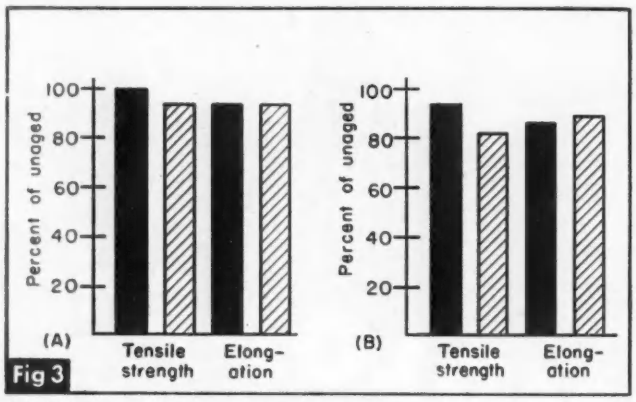
E. W. DAVIS Chief Electrical Engineer Simplex Wire & Cable Co Cambridge, Mass.



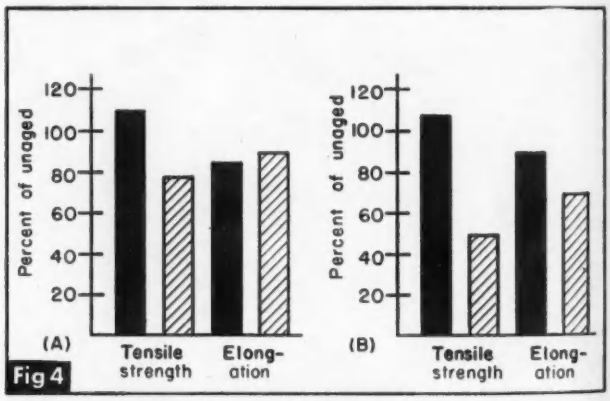
HEAT-RESISTING RUBBER, unaged



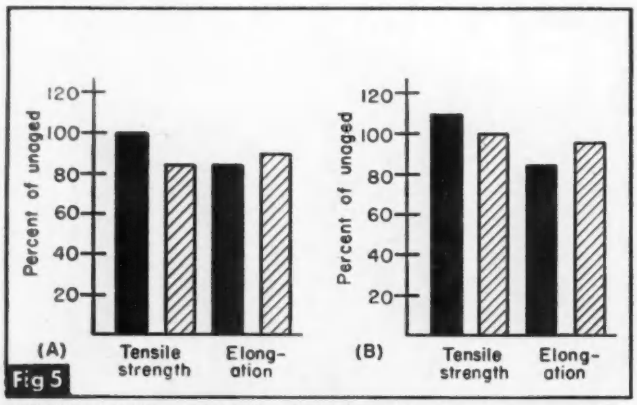
PERFORMANCE GRADE RUBBER, unaged



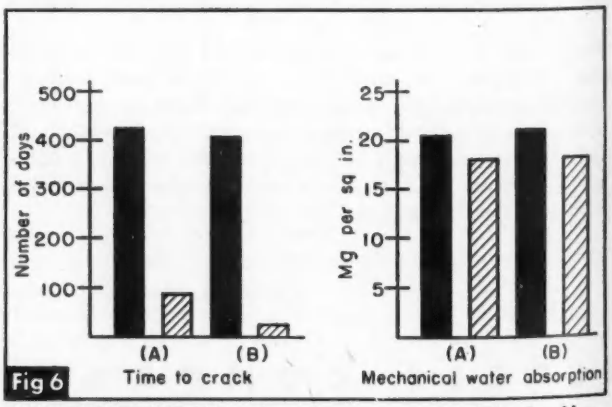
HEAT-RESISTING RUBBER aged in oxygen bomb at 70 C; (A) for 96 hr, (B) for 504 hr



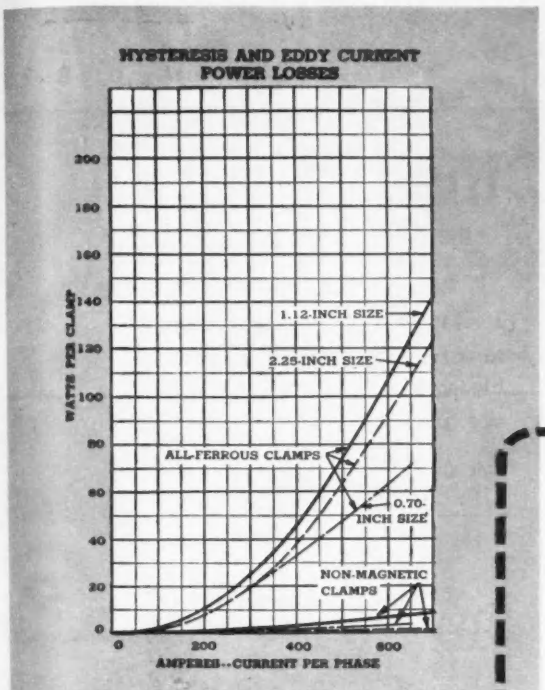
HEAT-RESISTING RUBBER (A) aged 20 hr in air bomb at 126 C, 80 psi; (B) aged 168 hr in air oven at 121 C

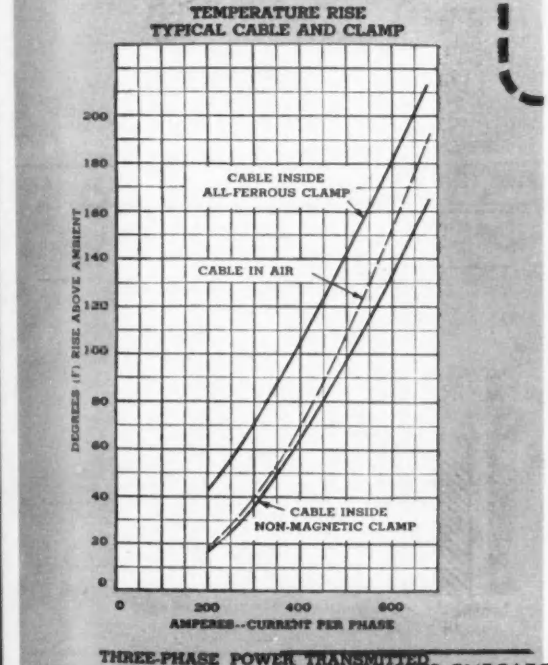


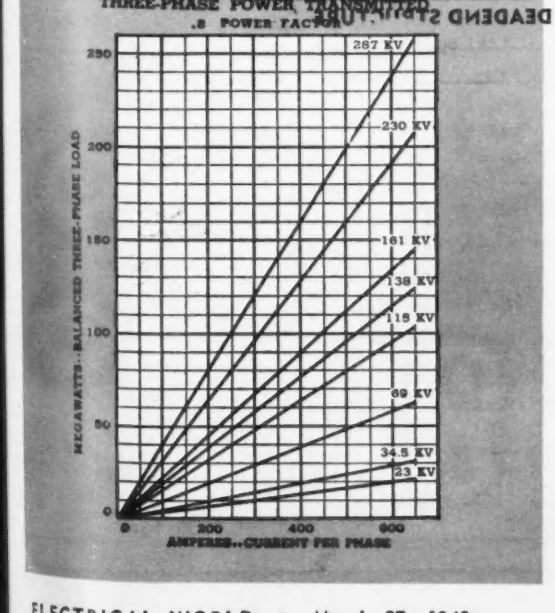
PERFORMANCE GRADE RUBBER which has been aged 96 hr at 70 C in (A) an oxygen bomb and for a corresponding time and temperature in (B) a Geer oven



HEAT-RESISTING (A) and performance grades (B) of rubber compounds—aged in sun out-of-doors and water absorption after 7 days in water at 70 C



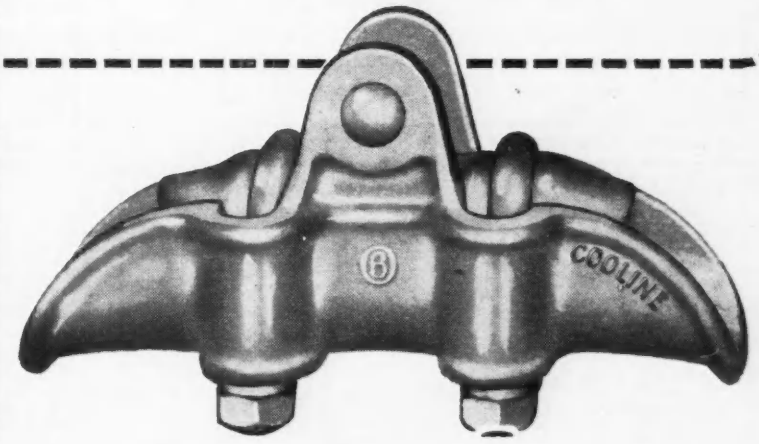




IS IT WORTH $14 APIECE JUST TO KEEP YOUR CLAMPS WARM

These facts come directly from a power company's own analysis of O-B COOLINE HARDWARE.

DATA: Current per phase, 480 amperes
Loss per clamp, 70 watts (.07-kw)
Installed cost 1 kw generating capacity, $200
Installed cost of generating capacity required to supply .07-kw loss per clamp, $14.00
Added cost of Cooline Clamp, $1.00



In return for one dollar expended for an O-B Cooline clamp, fourteen dollars less invested capital need be spent for generating capacity. In addition, there is the continuous saving in fuel whose only purpose is keeping the clamp warm.

Multiply this saving by the number of clamps on the average line and you can see why this power company immediately converted all outstanding hardware orders over to O-B Cooline.

This new non-magnetic, non-heating hardware may offer you equivalent savings that will amply repay your serious investigation. Deliveries are relatively fast. Write or wire for further information.

Ohio Brass

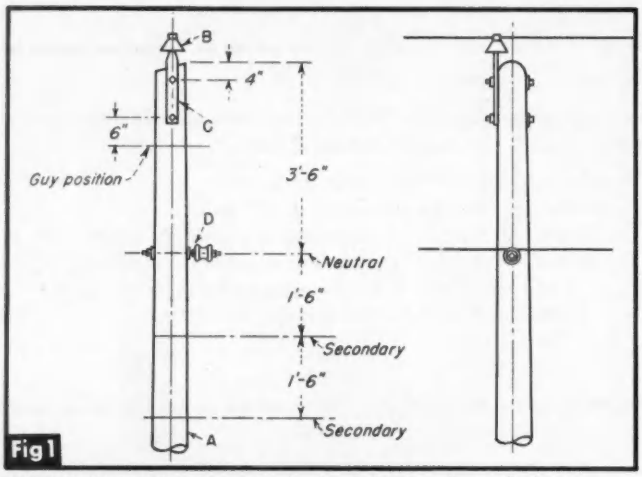
2676-H

MANSFIELD, OHIO, U. S. A.

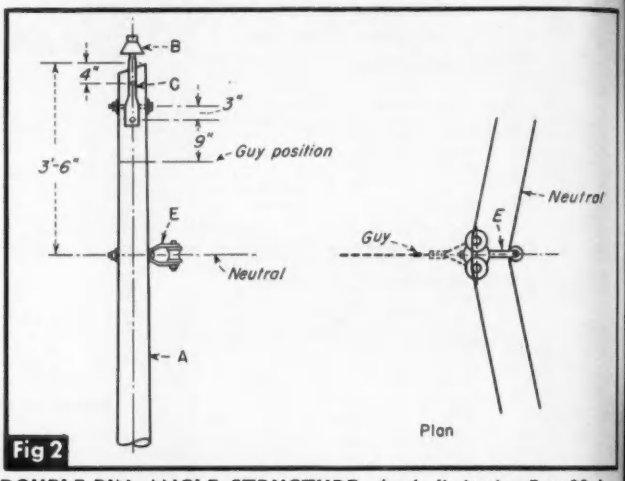
CANADIAN OHIO BRASS COMPANY, LIMITED, NIAGARA FALLS, ONTARIO

Pole Framing for Rural Lines 7.2/12.5 Y Kv, Single Phase

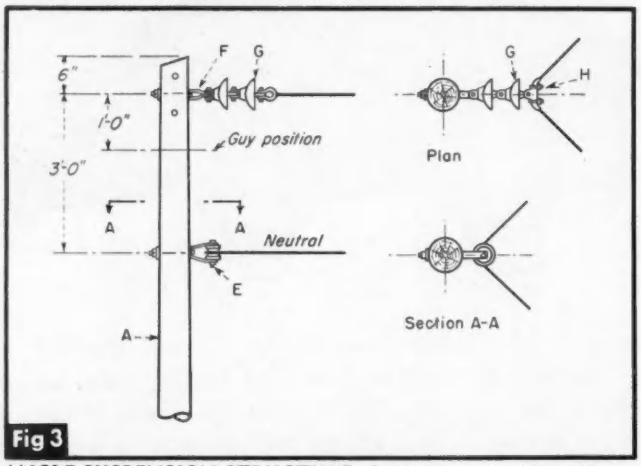
Poles with circuit arrangement and angle limitations; an adaptation from construction standards of Tennessee Valley Power Distributors Association, Chattanooga, Tenn.



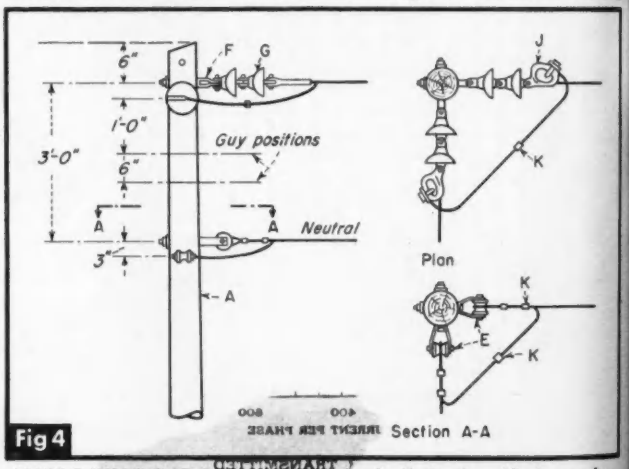
SINGLE-PIN STRUCTURE. Angle limitation 0 to 5 deg



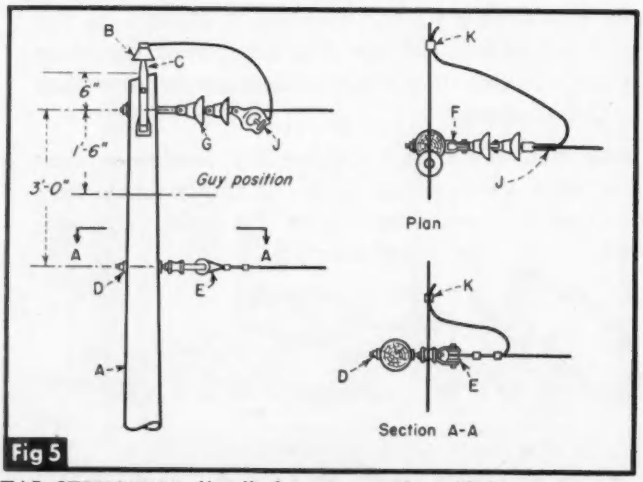
DOUBLE-PIN ANGLE STRUCTURE. Angle limitation 5 to 30 deg



ANGLE SUSPENSION STRUCTURE. Angle limitation 30 to 60 deg



ANGLE DEADEND STRUCTURE. Angle limitation 60 deg and up



TAP STRUCTURE. Usually for a tap at about 90 deg

List of Major Materials

Item	Description	Quantity for Fig 1	2	3	4	5
A	Pole, as specified	1	1	1	1	1
B	Insulator, pin type, 12 kv	1	2	..	..	1
C	Pin, pole top, length as specified	1	2	..	..	1
D	Bracket, spool bolt, double upset	1	..	..	..	1
E	Assembly, insulated secondary clevis	..	1	1	2	1
F	Clevis, dead end or eyebolt	..	..	1	2	1
G	Insulator, suspension	..	..	2	4	2
H	Clamp, suspension	..	..	1	..	..
J	Clamp, strain	..	..	..	2	1
K	Connector, as specified	..	..	..	6	4

LANNED IGHTING *with*

PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT

"Pittsburgh" Permaflector

A PERMAFLECTOR PORTRAIT
Joseph DeRoy & Sons
Architect: Harry H. Lefkowitz; R. A.
Electrical Contractor: D. Levinson

plans call for fluorescent, incandescent, or a com-
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he light you want where you want it" is yours
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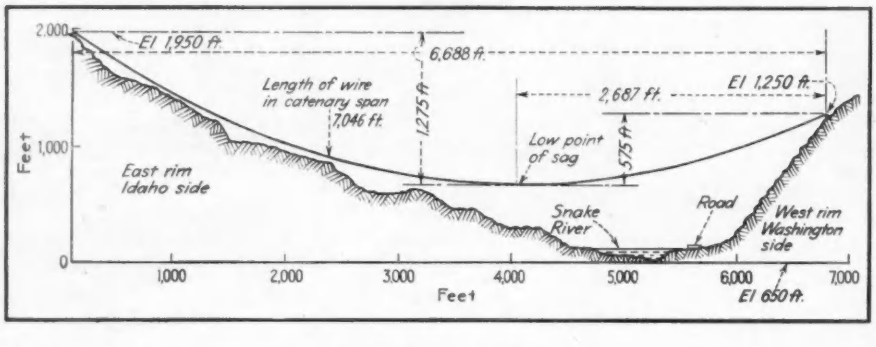
DISTRIBUTED BY BETTER ELECTRICAL WHOLESALERS EVERYWHERE

Lighting Engineers in All Principal Cities

6688-Ft Span Used In Canyon Crossing

POWER LINE CROSSES Snake River canyon. View to south. Wood pole supports (circled) are for a 6,688-ft. span. Graph (below) shows canyon profile and catenary construction



ACROSS THE LOWER end of the roaring Hell's Canyon, a 2-conductor, 7.2 kv power line was constructed by the Clearwater Valley Light & Power Association, Lewiston, Idaho. The extension was needed to serve a rural area in the southeast corner of Washington and several ranch houses at the bottom of the canyon. Power source was on the Idaho side of the Snake River.

No Maintenance Needed

The crossing included a span 6688 ft horizontally between poles. This span has been in place for about 7 yr and has been subjected to all manner of stresses in the form of ice loads, winds and heat. No maintenance has been required. The time and care expended in the designing and installing of this span is apparently vindicated.

In that vicinity the canyon is approximately 2,600 ft deep and 10,000 ft from rim to rim. Slope on the Idaho side averages 30 deg and on the Washington side 45-50 deg. Both slopes are broken periodically by lava bluffs 20 to 30 ft high. The river is approximately 800 ft wide, very deep and swift. Beaches and banks make a total width of about 1,500 ft of "flat" ground in the canyon bottom.

The span was located so that the east end could be reached with trucks and machinery. Both cables were swung down between two "razorbacks" for 3,000 ft, thus keeping them out of navigable air space, then out in the open across the river and 600 ft above it, and finally to the west end which is about 700 ft lower than the east end. The west pole support is located so that a single 2,000-ft span brings power to the river area.

Conductor used is a 7 No. 9 Extra High Strength Copperweld. Cable diameter is 0.343 in.; rated ultimate strength is 11,200 lb; and weight is 256.9 lb per 1,000 ft. Horizontal cable tension under heavy loading (½ in. ice, 8 lb wind, zero deg F) is 66.7% of ultimate strength. Assumed resultant loading is 1.188 lb per ft for heavy loading conditions (cable plus load). From previous experience in this area it is very unlikely that loading will ever exceed medium loading. If unprecedented loading occurs, it may be noted from the profile that under such conditions the cable would rest on the hillside at several points, thus shortening the effective free length of the spans. This should provide an added margin of safety.

To support the dead-ending assembly and withstand the anticipated loads of the cable, a treated Western Red cedar pole is used at both ends of each span. Present installation consists of two poles 120 ft apart on each rim. A third pole can be set when the power load warrants 3-phase.

Poles Set In Rock

The poles were selected from a stock of "boom logs" in the Weyerhauser Pole Co yard. They are approximately 2½ ft diameter at the groundline, tapering to an 18-in. diameter at the top. The poles are set 6 ft deep in solid rock and are an average height of 25 ft above ground. Their strength is sufficient to hold the span without guys when the conductor is at its breaking point. Each pole is guyed four ways.

Some details of the stringing operation will be given in an article in an ensuing issue.

•

Capped Pole Supports Transmission Tower

A. BISSIRI
Department of Water and Power
City of Los Angeles, Calif.

TEMPORARY SUPPORT of one leg of a 132-kv transmission line tower enabled the Department of Water & Power, City of Los Angeles, to complete a repair job on the tower leg in

You KNOW you can rely on CHANCE

For Greater Line Security--For Proven Anchor Values

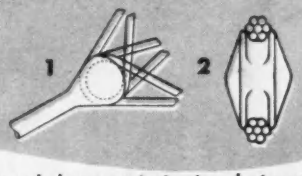
CHANCE Anchors lead the field today . . . because you—the engineers and men responsible for line construction—*know* they can be depended upon to do the job . . . because you have been sold on the quality, sound design, and long life of these anchors—produced by the only Company that manufactures a complete line of anchors for all guying requirements.

The A. B. Chance Company has steadily increased its production facilities to meet the tremendous demands generated by your post-war construction needs. Now these production lines are capable of turning out more anchors annually than were used by the power and communications industries in any pre-war year. Chance Anchors in most types and sizes are now available for 30 to 60 day delivery.

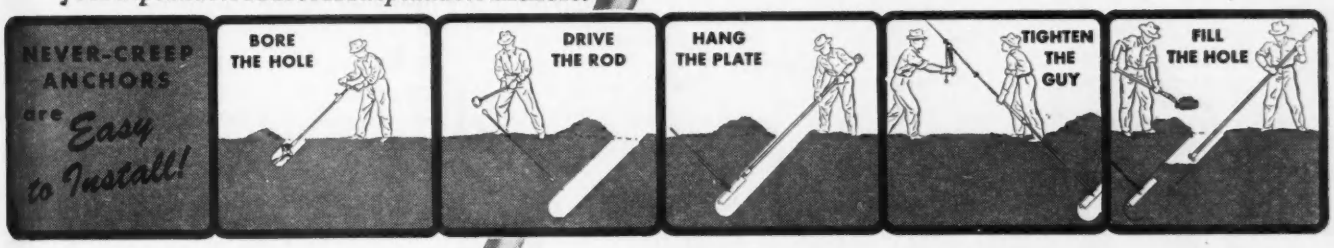
The next time you order, remember CHANCE —your *dependable* source for *dependable* anchors.

Improved Thimbleye Forged Steel Rod

This high strength, forged steel rod is pointed for easy driving through solid earth and features the famous improved Chance Thimbleye.



1. Full rounded eye protects strand at varied angles, aids slack pulling.
2. Groove fits snugly around strand and prevents spreading.



Have you the new Chance formula for every guying condition? If not, write for your copy today.

The NEVER-CREEP Bolts through Solid Earth...

Chance Never-Creep Anchors offer the greatest line security under normal guying conditions because they are not dependent on the tamping of filled-in earth for their holding power. They pull entirely against solid, undisturbed earth. Tests, over a period of many years, prove that moisture penetration has less effect on the holding power of Never-Creep Anchors than on any other type of anchor. They can be installed with ease, simplicity and speed.

Always a favorite with line construction men, Never-Creep Anchors have been improved by reinforced steel construction . . . and are better than ever before!

Reinforced STEEL PLATE

Never-Creep plates are formed of structural steel, reinforced with a high carbon steel core plate. Three plates are welded together in the area of greatest pull. Creep guards are welded to the top of the plate. Socket has reinforcing ribs.

C482

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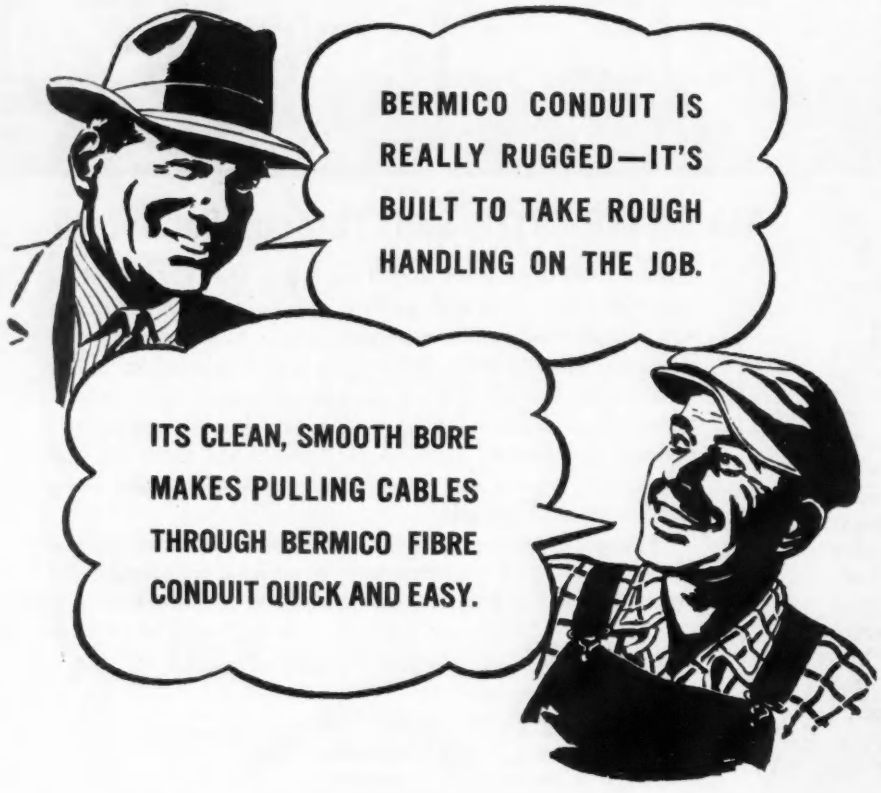
CENTRALIA, MISSOURI • SAN FRANCISCO, CALIFORNIA

ABC INDUSTRIES

BERMICO* FIBRE CONDUIT


BERMICO CONDUIT IS REALLY RUGGED—IT'S BUILT TO TAKE ROUGH HANDLING ON THE JOB.
ITS CLEAN, SMOOTH BORE MAKES PULLING CABLES THROUGH BERMICO FIBRE CONDUIT QUICK AND EASY.

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Offices in all leading cities

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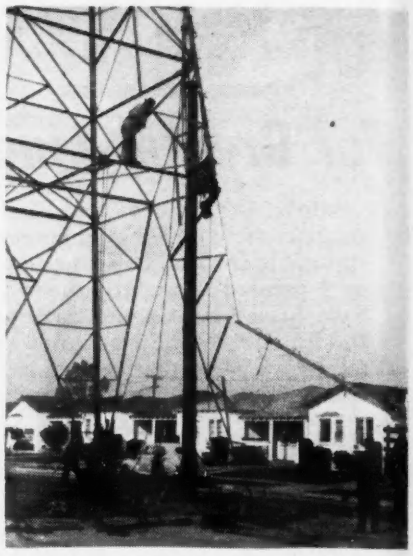
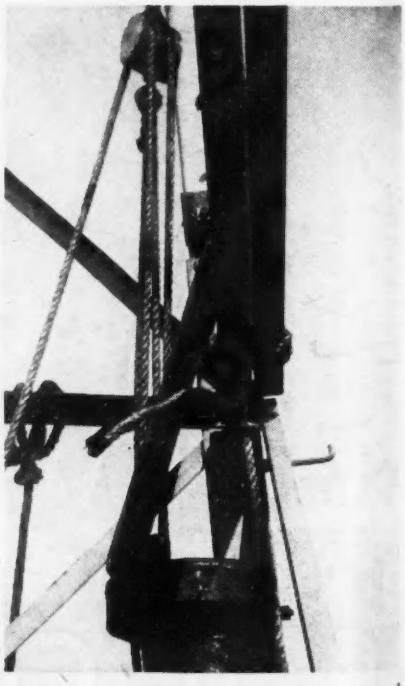
BERMICO FIBRE CONDUIT—A PRODUCT OF BROWN COMPANY



DEFORMED TOWER LEG is being removed after steel-plate capped pole has been placed to support part of tower weight

less than 8 hr. A fast-moving automobile struck the tower, badly bending one of the diagonal braces, deforming the tower leg, and twisting the stub at the concrete line.

To remove the damaged leg unit, the tower was supported with a pole as shown. A fabricated steel plate cap was mounted on top of the pole and bolted to the tower above the tower leg splice, to give a positive slip-proof support. Wooden wedges were driven under the foot of the pole to force it to take part of weight.



FABRICATED STEEL PLATE CAP mounted on top of pole is bolted to tower above tower leg splice. Cap provides a positive slip-proof support for part of tower weight as wooden wedges are driven beneath base of pole

Hundreds upon Hundreds used

throughout industry and on ships

Limitorque AUTOMATIC VALVE CONTROLS

Yes, "push button" operation of valves eliminates the slow, tiresome and frequently hazardous task (not to mention the valuable time of one or two men) of manual opening and closing. And, in addition to these advantages, the "Limitorque" Valve Control positively protects the valve stem, disc and seating rings from damage caused by foreign objects obstructing the closing of the valve, because the motor is *shut-off automatically* by the thrust exerted on the valve disc. . . . Then too, time is saved by the much speedier opening and closing of valve.

Limitorques are used on plug, cock, gate or globe valves—for Steam, Water, Gas, Oil, Air and Process Fluids. They are self-contained units and are mounted on top of valve yoke . . . no extra gears, nuts or bearings are required and all clutches and connecting sleeves are eliminated.

Send for latest Limitorque Valve Catalog, and be sure to use your Business Letterhead when writing.

Philadelphia GEAR WORKS INCORPORATED

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO . . . IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

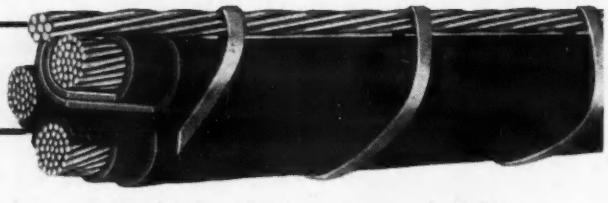
Industrial Gears and Speed Reducers
LimiTorque Valve Controls

Collyer Self-Supporting Aerial Cable and Collyer Suprene Type RR Non-Metallic Underground Cables are dependable through flood or hurricane. Their dependability is built-in . . . with materials selected for maximum resistance to weather, wear and corrosion. On-the-job experience demonstrates the value of their sound construction and unique design. Rugged outer jackets are of pliable, impervious Neoprene. Collyer-developed insulations provide high dielectric strength and resistance to moisture. Fast to splice or tap, low in maintenance . . . these cables are exceptionally economical.

UNDERGROUND

Collyer Suprene Type RR Non-Metallic Underground Cable is unsurpassed for direct burial in the earth or installation in ducts. High moisture resistance, plus a tough, resilient lead-cured Neoprene jacket, assures long life and trouble-free performance at low cost. Soil acids, chemicals and alkalies have little effect on this rugged cable.

OVERHEAD

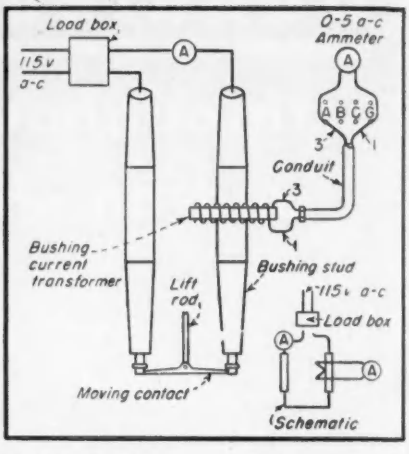


Messenger and cable preassembled at the factory permit Collyer Self-Supporting Aerial Cable to be installed rapidly . . . the cable may be spliced hot. Tree trimming is practically eliminated. Storms, sleet and falling limbs will not interrupt service. Insulation is highly resistant to corona, moisture, sunlight, abrasion and impact.

Write for information.

Collyer INSULATED WIRE CO.
245 ROOSEVELT AVENUE • PAWTUCKET, RHODE ISLAND

How to Check Ratio Of Bushing Transformer



CONNECTION FOR CHECKING ratio of bushing-type current transformer

Method for checking ratio of bushing type current transformer has been provided in a station maintenance manual of an eastern utility.

Connections are shown in an accompanying diagram. Procedure follows.

To Check Transformer Ratio

1—Connect load box and large scale ammeter (or with current transformer) in primary circuit as shown.

2—Connect 5-amp ammeter in secondary circuit to lower switchboard current studs after removing links. Be sure load box and this ammeter are on same phase.

3—Close breaker.

4—Adjust load box to desired current.

5—Read both ammeters.

6—Ratio of current transformer

$$= \frac{\text{Current in primary circuit}}{\text{Current in secondary circuit}}$$

7—Repeat above test on other two phases.

Test and Inspect Bushing Transformers

A PROCEDURE IS outlined for testing insulation and inspecting bushing-type current transformers such as used on oil circuit breakers of 2.3 to 132 kv and higher. This procedure is an adaptation from a manual on station electrical maintenance by a Pennsylvania power company. The individual steps or operations follow.

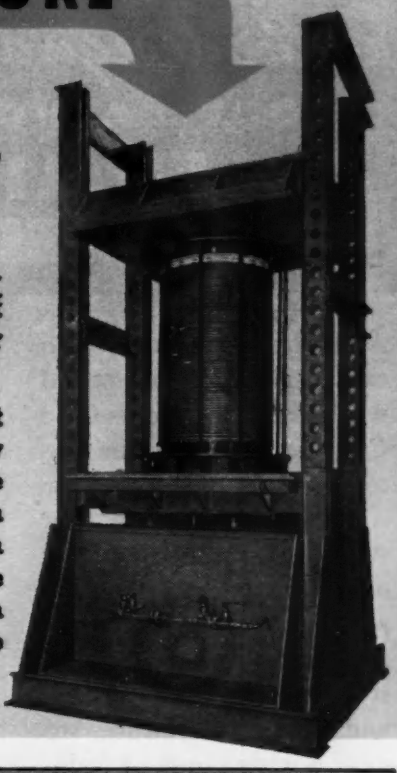
When required, the transformer

PUTTING ON THE PRESSURE

GIVES POSITIVE PROOF THAT YOUR TRANSFORMER WILL WITHSTAND SHORT CIRCUITS

It's sure. It's positive. No guess work. No wishful thinking. Putting on the pressure is an added measure of safety engineered into every Pennsylvania Transformer with helical or pancake coils.

THIS IS WHAT WE DO — We calculate the total short circuit force that would be produced by a short circuit at the secondary terminals with the rated voltage maintained on the primary. We compress the coils with this pre-determined force and treat them in such a manner that they are self-supporting, and will maintain their shapes when mounted on the core. Strong supports are provided at the top and bottom of the coils to keep the coils in their precompressed shapes. No movement can take place in the transformer coils, even under the most severe short circuit.

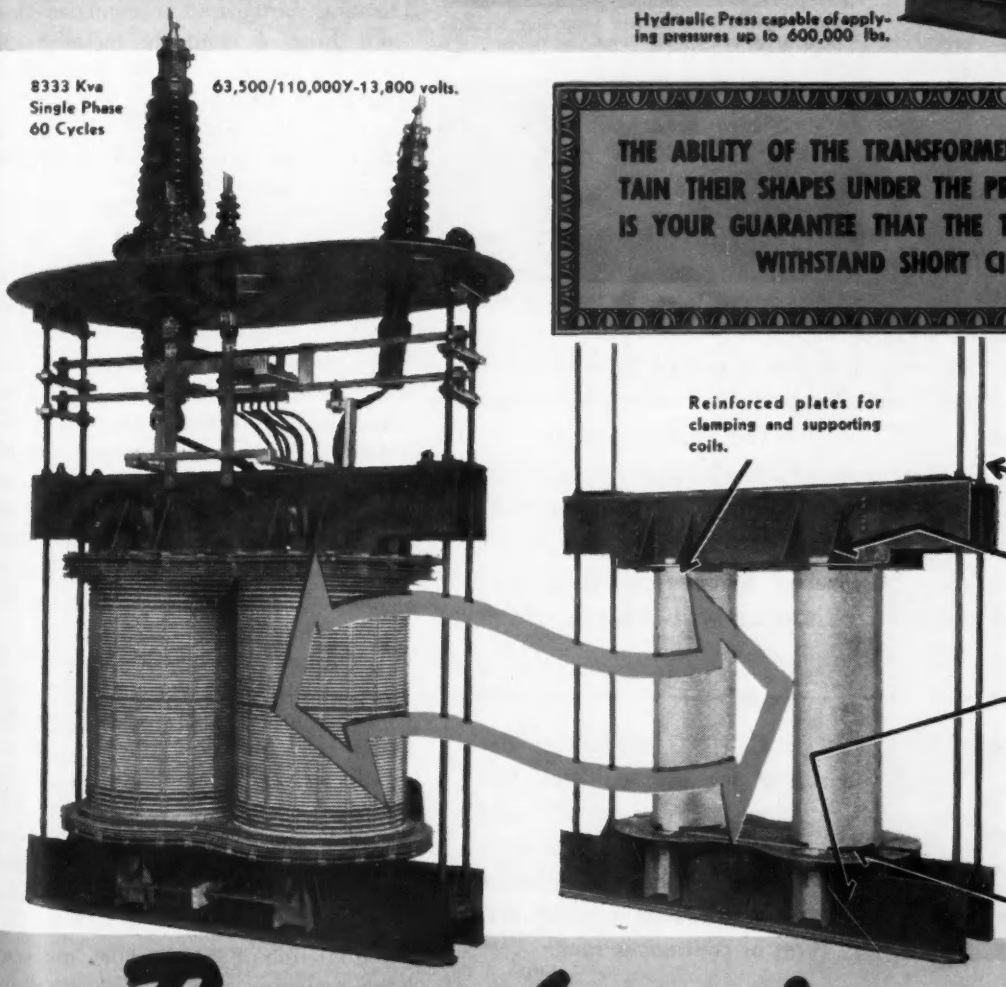


Hydraulic Press capable of applying pressures up to 600,000 lbs.

8333 Kva
Single Phase
60 Cycles

63,500/110,000Y-13,800 volts.

THE ABILITY OF THE TRANSFORMER COILS TO MAINTAIN THEIR SHAPES UNDER THE PRESCRIBED PRESSURE IS YOUR GUARANTEE THAT THE TRANSFORMER WILL WITHSTAND SHORT CIRCUITS.



Reinforced plates for clamping and supporting coils.

Tie rods for connecting top and bottom core frames and for clamping coils.

Clamping plates hold coils to their precompressed size. Note the ruggedly constructed side-frames, the extra strong bolts, nuts and rods.

Drum cut away to permit cooling oil to flow past core steel.

Pennsylvania
TRANSFORMER CO., PITTSBURGH, PA.

Pennsylvania TRANSFORMERS

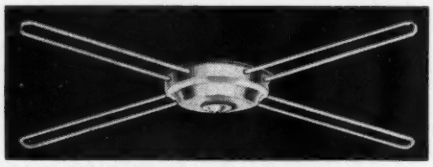
Pioneers and Originators in the design and promotion of

COLD CATHODE FIXTURES

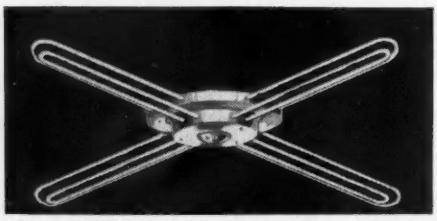
ILLUMINATING ENGINEERING CO.

After intensive study and exhaustive experimental work we introduced Cold Cathode and Slimline fixtures — covered under design patents—a full four years in advance of any other designer. Thus as pioneers and leaders in this new field we offer an extensive line of Cold Cathode and Slimline Fixtures to meet a wide range of lighting needs.

V-280 Lumeneer, Jr. Designed especially for us with the modern cold cathode hairpin lamps.



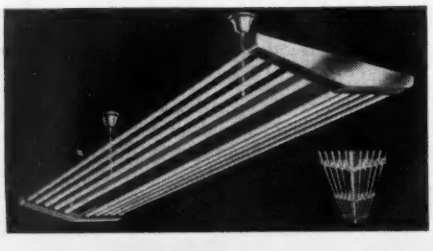
UX-480 Lightaleer, Jr. a four lamp unit for use with cold cathode hairpin lamps.



UX-880 Lightaleer, Sr. an eight lamp unit designed for cold cathode hairpin lamps.

From the standpoint of efficiency, actual tests made in 82 standard classrooms (22′ x 30′ x 12′ ceilings) after six months' service with 24 Hairpin lamps on the ceiling, readings on desk tops with a white sheet of typewritten paper resulted in an average reading of 20 footlamberts—a ratio of 48 to 1. This is well within the recognized limits required. Other tests showed that after $4\frac{1}{2}$ years of service maintenance was practically nil and that the installation was giving excellent lighting and perfect light distribution.

Contact your electrical distributor and learn from him the many advantages of Cold Cathode lighting with Illuminating Engineering fixtures.



I E C—1080 Moderneer designed for use with ten 96" slimline lamps or ten 93" cold cathode lamps. This represents one of our group of slimline models available in single fixtures or continuous runs.

ILLUMINATING ENGINEERING *Company*

Designers and Manufacturers of Slimline and Cold Cathode Lighting Fixtures

2347 E. NINE MILE ROAD · · · HAZEL PARK, MICHIGAN

will be tested using a 500-v insulation tester such as a Megger type. If this is not available, use a similar 1,000-v instrument. Include the entire current transformer circuits up to the switchboard. Be sure to remove the current transformer links located on the switchboard before testing. Of course, it will be necessary to remove any grounds in order to test the circuit. After testing, be sure to replace the grounds on the current transformer secondary.

Check Copper Grounds

Check to see that copper grounds between transformer housing and tank are satisfactory. During breaker trip-outs, explosive gases may collect in the housing and then explode when there is another surge on the system.

Inspect these transformers for loose connections and general mechanical condition. Keep current transformers painted and free from stain or rust. Check to see that the metal case around the current transformer does not form a complete metallic circuit by touching the bushing flange. Such a condition forms a short circuiting turn which will change the ratio of the current transformer. This is important.

Reconnect Leads

Inspect the current transformer terminal boards and check the tightness of the conduit connections. Also, all connections must be tightened and the terminal blocks (if any) must have insulation tested. Be absolutely sure that any leads removed are reconnected to their proper terminals. If there are tapped secondaries, the taps or leads that are not used should be insulated with tape or fastened to terminal boards. They must not short-circuit any of the windings.

Moisture in current transformers can sometimes be detected by a ratio test. If moisture is present the ratio will be lower than normal, or the ratio will change if power is left on a short time. If there is a gray mildew on the leads, it is probably due to moisture. Remove condulet covers and check for leaking gaskets. If the condulet covers are located on the bottom side of the condulet, much of the moisture can be eliminated by drilling two $\frac{1}{4}$-in. holes in the condulet covers. Be sure in all cases to select condulets so located that there will be either natural ventilation or updraft of air.

Sometimes it's Expensive to be Bashful...

(for instance, when specifying wiring)

True enough, familiarity often breeds contempt. But being familiar with the characteristics of wires and cables you need in your operations is *your* job. So, next time you order, ask your suppliers these questions that will mean savings to you:

1. Is this cable *permanently insulated*—with *impregnated asbestos*—like Rockbestos A.V.C.?
2. Will it last, and last, and last—give years of trouble-free performance with greatly reduced maintenance—like Rockbestos A.V.C.?
3. Will it take constant high temperatures, up to 230°F., and withstand severe heating and cooling cycles, fumes, oil, grease and flame, without baking brittle, drying out, cracking, flowing, swelling, rotting, burning or failing in any way—like Rockbestos A.V.C.?

If the answer to these questions is an emphatic YES—buy with confidence—because you're *getting* Rockbestos A.V.C., the cable that meets all severe condition requirements.

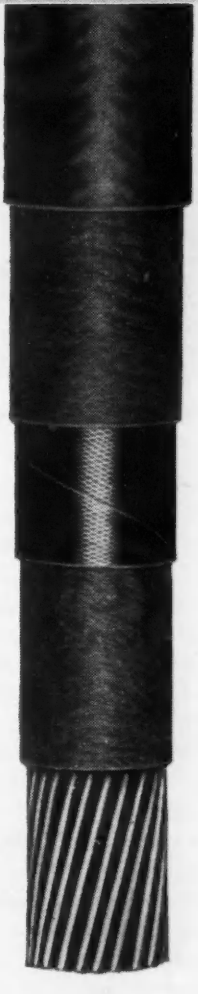
Operation-protecting Rockbestos A.V.C. constructions in 600 to 5000 volt ratings include single and multi-conductor power cables, switchboard and lighting wires, control cables, lead sheathed, armored and National Electrical Code types. Write for recommendations or samples.

ROCKBESTOS PRODUCTS CORPORATION
227 Nicoll St., New Haven 4, Conn.

NEW YORK BUFFALO CLEVELAND DETROIT CHICAGO
PITTSBURGH ST. LOUIS LOS ANGELES OAKLAND, CALIF.

ROCKBESTOS A.V.C.

The Wire with Permanent Insulation



ROCKBESTOS A.V.C. 600 VOLT POWER CABLE—CODE TYPE AVA
(Max. operating temperature 230°F.)

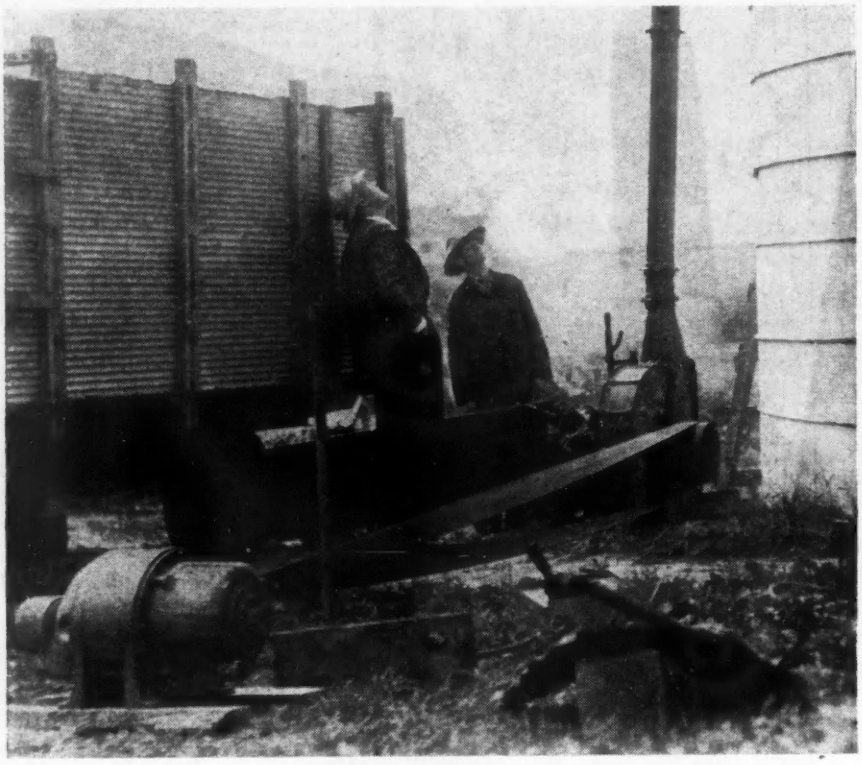
The cable illustrated and similar types rated up to 5000 volts assure trouble-free performance in hot locations with this construction:

- A tough, non-aging impregnated asbestos braid resistant to heat, flame, moisture, grease, oil and corrosive fumes.
- An outer wall of impregnated felted asbestos that won't dry out, crack, flow, rot or burn—also protects varnished cambric beneath from heat and oxidation.
- Varnished cambric for high dielectric strength and added moisture resistance.
- An inner wall of heat and flame resistant impregnated asbestos which acts as a baffle between the varnished cambric and hot conductors.
- The conductor is perfectly and permanently centered in non-flowing heat resistant insulation that provides greater current carrying capacity.

One of the 125 different wires, cables and cords designed by Rockbestos to meet severe or unusual operating conditions.

LOAD BUILDING

Tests of 7½ Hp Motor for Silo Elevator



MOTOR AND BLOWER elevate chopped forage into silo

J. W. HALL and A. W. COOK
Agricultural Engineers
Appalachian Electric Power Co
Roanoke, Va

MANY FARMERS in our area are now using field choppers to harvest their forage crops. These harvesters have proved very successful as a means of saving labor, and it looks as though a large majority of the dairy farms will be using them within the next few years. The harvesters pick up and chop the forage crops in the field and blow the ensilage into a truck or wagon. A separate blower, located at the silo, elevates the ensilage. This requires an additional tractor which very often has to be borrowed or rented. We have had several inquiries as to the possibility of operating these blowers with an electric motor.

On four farms, tests were made on these blowers driven by 7½ hp motors.

Each blower was manufactured by the John Deere Co and has a 30-in. diameter fan with an auger feed attached. For best results from the 7½-hp motor we found that the blower should be run at 800 rpm, which gives a fan-tip speed of 6,300 fpm for elevating corn ensilage at the rate of 15 tons per hour into silos up to and including 35 ft in height. In blowing grass ensilage, we found it would be necessary to increase the speed of the blower from 10 to 12% to compensate for this lighter material.

Must Operate At 800 Rpm

For silos 30 ft and less in height, the blower can be operated at a slower speed and still elevate satisfactorily. Due to the fact, however, that rate of feeding is directly in proportion to the speed of the blower, it is necessary to run the blower at 800 rpm to keep ahead of the field chopper under average conditions and crops. For silos higher than 35 ft, we found it was necessary to operate the blower at 875 rpm, and to unload the ensilage from the wagon into the blower hopper more uniformly. Otherwise the motor would become overloaded and lose its speed which in turn would cause the blower pipes to clog up.

Table of Speeds

On the basis of the fan-tip speed of 6,300 fpm, the following table shows the speed for blowers of different diameters for elevating ensilage into silos up to 35 ft in height.

Diameter of Blower	RPM
30 in.	800
36 in.	675
42 in.	575
48 in.	550

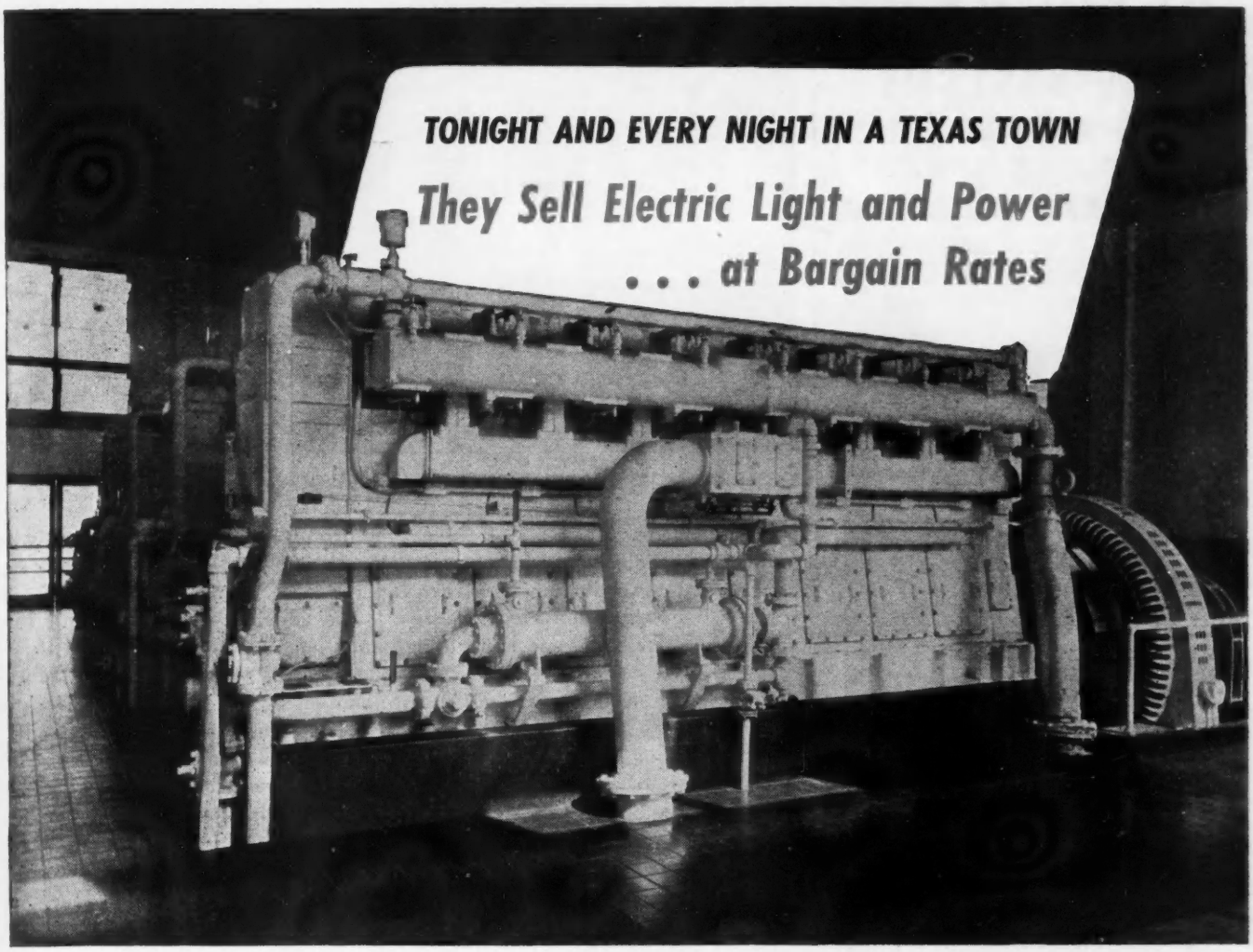
If a 10-hp motor were available, we would recommend operating the 30-ft. blower at 900 rpm, or a fan-tip speed of 7,100 fpm.

•

Avoids Reflections in Show-Glass Windows

ELIMINATION OF THE OBJECTIONABLE day-time reflections in glass of display windows, and highlighting of articles placed close to the glass, are obtained by means of a unique lighting installation at the Thad B. Reese, Inc, jewelry store, Albany, Ga.

In these comparatively small windows, it is a problem to find place for the lighting units necessary for the desired direction and intensity of lighting. Often the light strikes the merchandise at the front of the window from the rear rather than from the front. Study by Georgia Power engineers overcame these difficulties



TEN years ago, the folks in Robstown wanted a dependable source of power. They got it . . . with two 6 cylinder, 525 hp. and two 8 cylinder, 700 hp. Superior Diesel Engines.

Just six years after this plant was completed, power rates were reduced! In addition to bargain rates, this plant has provided a substantial net profit.

Many other communities throughout the country are benefiting by the dependability and economy provided by Superior Diesels. These big, husky engines are used for water supply systems, sewage disposal plants, airport lighting and for many other vital municipal services.

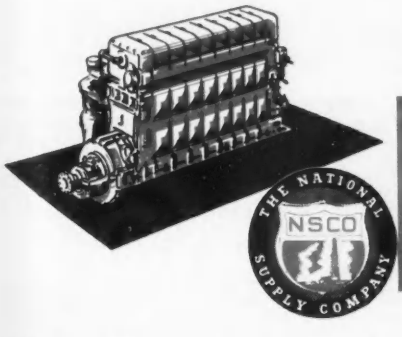
Superior Diesels are made in supercharged and non-supercharged models that range from 170 to 1440 horsepower. One of our field engineers will be glad to point out the advantages these engines have for your community.

PUSH-BUTTON DUAL FUEL

A Superior Feature

JUST PRESS A BUTTON TO BURN YOUR CHOICE OF FUEL

Superior is the first and only Diesel with push-button control that permits you to switch from oil to gas; or gas to oil instantly — with the flick of a finger.

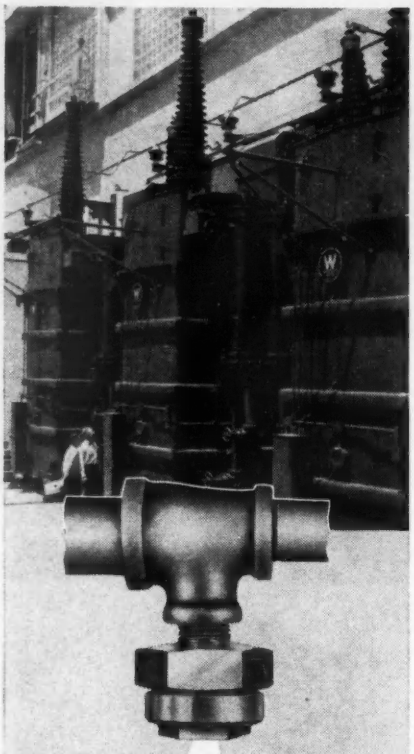


SUPERIOR ENGINE DIVISION OF
THE NATIONAL SUPPLY COMPANY
Plant and General Sales Office: Springfield, Ohio

Superior DIESEL

Only Superior Diesel Engines Give You Superior Features

BLAW-KNOX
FOG SYSTEMS
OPERATE WITH THE SPEED OF ELECTRICITY



Activated by electric rate-of-rise supervised thermostats, they attack the fire instantly.

They spread a smothering cloud of fog over the fire, at the same time driving through to its base with a finely divided spray, cooling and quenching burning oil and inflammables.

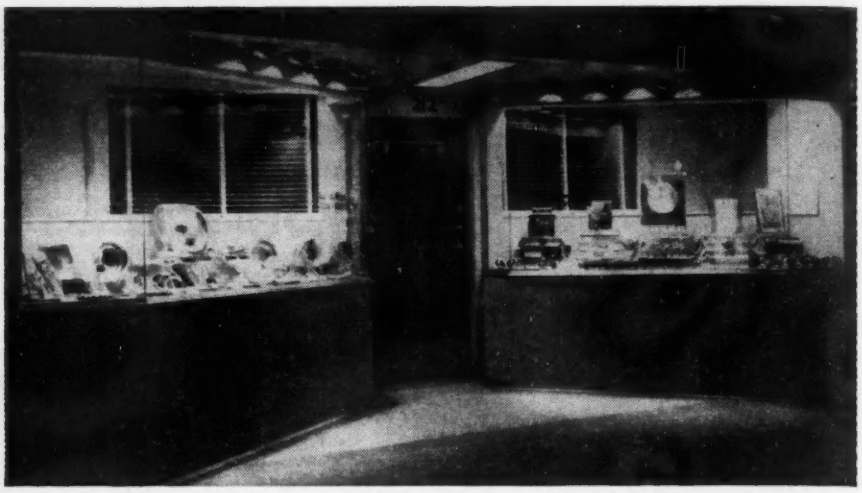
Clear passages in these nozzles prevent clogging, and their spray pattern is maintained in emergencies even with reduced pressures.

Listed by Underwriters Laboratories, Inc.
Approved by Factory Mutual Laboratories

ALSO—
Blaw-Knox offers Standard Wet and Dry Pipe Systems, as well as Thermostatically Controlled Pre-Action and Deluge Systems.

Write for Bulletin No. 2207

BLAW-KNOX
SPRINKLER DIVISION
OF BLAW-KNOX CONSTRUCTION COMPANY
829 Beaver Ave., N. S.
Pittsburgh 12, Pa.
Offices in Principal Cities



EXTERIOR SPOTS HIGHLIGHT merchandise in front of window in unique installation

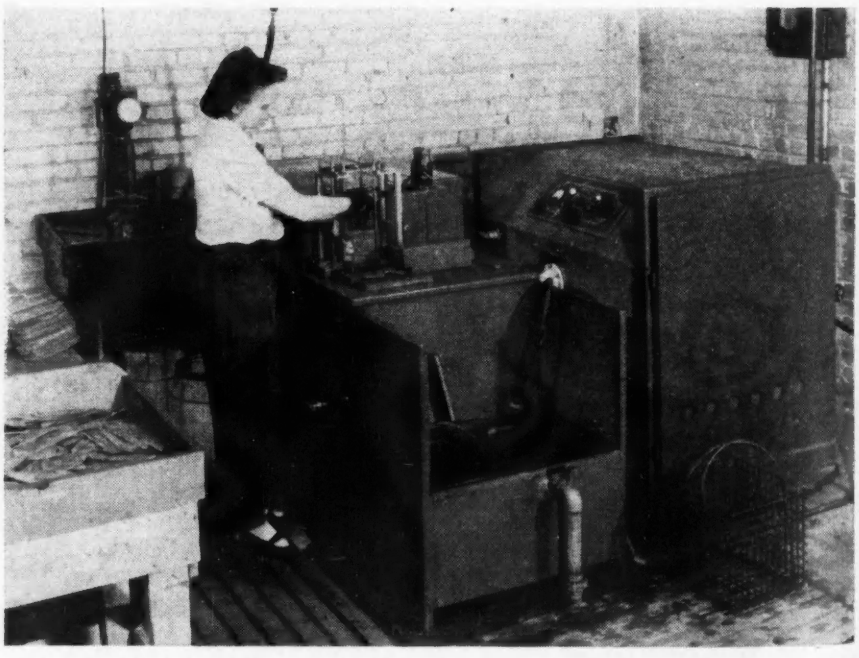
in this particular type of case.

Four PAR-38 spot lamps are mounted in the vestibule outside each window in recessed louvered adjustable units. The spots are angled so that the beam center passes through the plate glass at an angle of 28 deg above the eye level of a person standing a foot from the glass. Inside the window prismatic reflectors on 18-inch centers with 200-w. lamps are used. This combination produces 840 ft-c on the jewelry display.

The advantage in this unique installation is that articles in the leading edge of the window are highly illuminated from the front. Part of the heat from the lighting units is kept out of the window by having the spots mounted outside. The lights are operated day and night.

• • •

Induction Hardening Reduces Cost of Blades



H-F GENERATOR, single-turn induction coil, automatic work-handling equipment and quench tank are used to harden cutting edge of grass shear blades at 900 blades per hour

INSTALLATION OF A high-frequency generator has enabled the Hancock Manufacturing Co, Jackson, Mich., to reduce the cost of hardening grass shear blades from 2½ cents each to 1 cent. In addition to the savings, quality is improved. The generator is a Westinghouse unit rated 10 kw, 450 kc.

Formerly when blades were hard-

ened throughout, 50% of the blades required individual straightening. The product was satisfactory, but costly. The new method with automatic work-handling equipment produces 900 blades per hour, eliminates much spoilage.

The hopper of the work handling equipment holds a 3-min supply of blades to give the operator time to refill it and to remove the hardened blades from the quench tank.

Blades are automatically pushed out from the bottom of the stack in the hopper, positioned with the cutting edge in the inductor coil, exposed to a 3.5-sec surge of RF power, and ejected into a basket in the quench tank. A safety device shuts down equipment and generator in emergency.

•

3rd Texas Electric Show Issues Novel Invitations

THIS IS THE COVER of the invitation sent to prospective exhibitors in the 3rd Texas Electric Show, April 25, May 2, inclusive. It is printed in 3 colors on heavy stock, stands 15 in. high, and is 11 in. wide. The show is sponsored by the Texas Electric Service Co.

Display space, including decorative background, is offered to exhibitors at no charge. The power company also provides entertainment, publicity and advertising.

There are 70 display spaces in the building, also an outside area.

PIONEER RURAL ELECTRIC CO-OP, INC.
PIQUA, OHIO

SAVES $15,000 WITH
PACKAGED POWER
THE Albertson
UNIVERSAL REPLACEMENT
CORES and COILS

Fit any type
TRANSFORMER
CASE • SQUARE
ROUND • OVAL
HEXAGON
RECTANGULAR

• The old 1-KVA core and coil removed.

• The old transformer case rebuilt.

• The "Packaged Power" 5-KVA Albertson Universal Replacement Core and Coil.

THE NEED

Because of a shortage of new transformers and greater power demands due to the Co-op's rapid growth, the 1-KVA transformers on its lines were heavily loaded. Voltage suffered and service qradually declined from the ideal. A quick changeover to larger transformers was necessary.

THE ANSWER

(as given by A. E. Halterman, manager of Pioneer Rural Electric Co-op, Inc.)

"Two companies agreed to furnish 5-KVA coils and cores for our cans. We have purchased from both suppliers and finally a material contract with the Albertson Electric Company of Milwaukee, Wisconsin was signed by our board and approved by the Administrator of the Rural Electric Administration for 500 specially designed and engineered 5-KVA cores and coils to be installed in old 1-KVA square cans. "The cores and coils were delivered to the Co-op shop in sealed shipping cases so that moisture can be kept out until they are immersed in the oil in the cans. At the Co-op shop the cans were cleaned and painted, the cores installed, and a new lightning arrester and a modern fuse holder installed along with secondary gaps, etc., making the finished can the same as a new transformer with a new number and name plate."

THE SAVING

"After retiring the cost of the old transformer, and rebuilding a new transformer, the difference between the cost of a new can on the market and the cost of rebuilding saved the Co-op a little over $20. each. To this we can add another $12.11 — material salvaged that would have been scrap. Thus, the net saving to the Co-op is over $30. per transformer, or a total of $15,000 saving on the 500 transformers delivered under the present materials contract. "We are very grateful to the Albertson Company for their untiring efforts in perfecting this equipment, especially for our problem, and also for the fact that they worked with the Technical Standards division of the Rural Electric Administration in designing and testing until the present high quality product has been developed."

CHECK THESE FEATURES

1. Fit any type of case. 2. Shipped in moisture-proof containers. 3. Can be stored in stockroom for emergencies. 4. Lowest cost — no freight charges to pay on repair jobs. 5. Replacement cores always available. 6. Easy to install. 7. No delay on repairs—install on job if necessary. 8. Minimum core and copper losses give maximum overall efficiency. 9. Increase your 1 and 1½KVA Transformers to 3 and 5 KVA capacity this simple, quick, cost-saving way. Efficient design assures long life. 10. Guaranteed for one year.

ESTABLISHED 1910
ALBERTSON

Since 1910

ALBERTSON ELECTRIC COMPANY
3532 W. PIERCE ST. MILWAUKEE 4, WIS.

1 National Advertising in Magazines

In 1948 G-E Lamp ads in The Post, Life, and other magazines will bring an average of 16 messages to every wired home—promoting better lighting and wider use of G-E lamps.

A quick review of G-E Lamp activities

4 Trade Advertising to Dealers

Month after month G-E Lamp ads tell dealers why G-E lamps "Sell on Sight" and help them cash in on public preference for the bulbs marked G-E.

5 Point-of-Sale Merchandising

Soon to go to distributors is the new G-E Lamp Merchandising Manual—most complete book of its kind—containing 1131 ideas for displaying lamps. This is in addition to regular G-E Lamp display material.

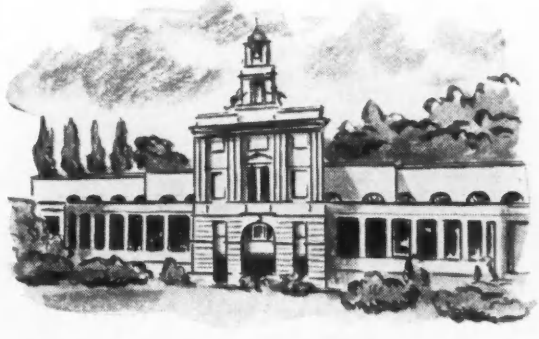
2 The Willie Piper Show on the Air

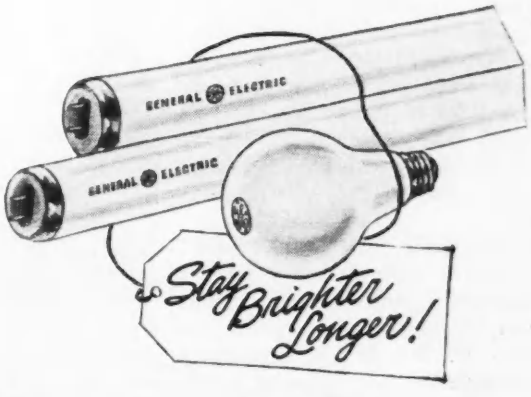
Over a million families listen to the new G-E Lamp program every Thursday over 166 ABC stations. This friendly comedy helps General Electric carry on its perennial war against bulbsnatching.

3 Commercial and Industrial Advertising

G-E Lamp ads in leading business magazines are carrying the Planned Lighting story to architects, store owners, office building managers, school administrators, theatre operators and industrial management.

that help you sell Better Lighting . . .





6 Sales Training

Fundamental and advanced courses in every major field of lighting are offered several times yearly at the G-E Lighting Institute, Nela Park, Cleveland. Register your key men through G-E Lamp district offices.

7 Better Lighting Tools

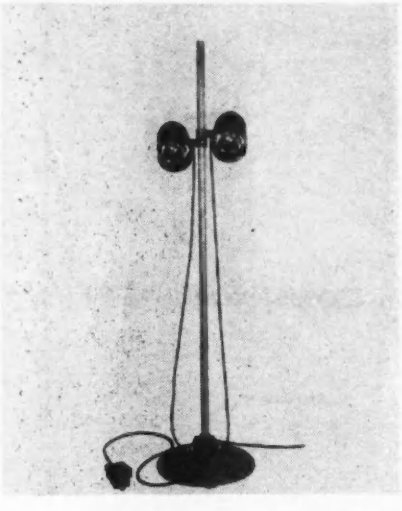
At General Electric laboratories, the world's greatest lamp research organization backs up your lighting promotion by always working to make G-E lamps *Stay Brighter Longer.*

G-E LAMPS

GENERAL ELECTRIC

NEW EQUIPMENT

Industrial Spot Light



A HIGH-INTENSITY industrial spot light is announced by Westinghouse Electric Corp, P. O. Box 868, Pittsburgh 30, Pa. It is said to be powerful enough to illuminate clearly welding, cutting, or brazing work when viewed through a No. 10 welder's glass before striking the arc. Particularly applicable for repetitive work, one of these spot lights is reported to cast a small-diameter circle of light of from 2500 ft-c brilliance when placed 3 ft from the work to 1000 ft-c when located 6 ft away. Two or more lights can be used if desired to any application requiring a small area of very high illumination.

The spot light uses a 6-v, sealed-beam type of light operated from a transformer built into the light housing; the complete assembly weighing approximately 5 lb. It can be mounted at any angle on 1-in. pipe or on its own stand by means of a clamp and positive-action spring-loaded swivel joint. The spot lights can be plugged into a service outlet since power requirement for the lamp and accessories is only 30 w at 115 v, 60 cycles.

•

Silicone Rubber Adhesive

A NEW ADHESIVE expressly designed for bonding silicone rubber to itself and to glass, metals, and ceramics has been developed by the General Electric Chemical Department, Pittsfield, Mass.

Known as GE adhesive No. 12509 the new type bonding agent, said to possess properties similar to silicone rubber, is reported to remain flexible and resilient over temperatures ranging from —70 F to 520 F and to withstand continuous temperatures of 300 to 350 F in a dry air circulating oven. It can also be used to bond glass to glass, glass to metals, and metals to metals.

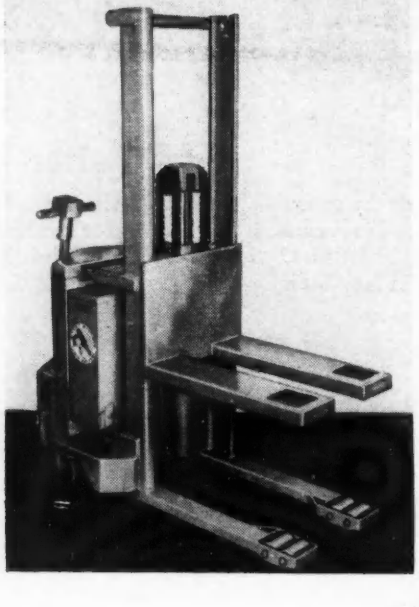
The new adhesive has proved useful in securing silicone rubber door gaskets directly to oven doors eliminating the need for clamps and bolts. It is also effective for joining the ends of extruded cured stock to form O-ring gaskets of uniform thickness.

•

Lift Truck

THE "JACK STACKER" designed for both movement and stacking of materials is manufactured by Lewis-Shepard Products, Inc, 285 Walnut St, Watertown 72, Mass. It has capacities up to 4000 lb and is available in four models —counterweighted, straddle type, open-end base with lifting arms, and platform type.

The electro-hydraulic lifting and lowering and the gear-drive traction unit are battery-powered through series wound motors. Control for two speeds, forward and reverse, for raising and lowering, and the horn button and key switch are mounted in the handle head. Electric brake is applied automatically when handle triggers are not held down.



Impact Tool Kit

A PORTABLE KIT containing an impact tool with a universal motor and standard accessories has been announced by Ingersoll-Rand Co, 11 Broadway, New York 4, N. Y.

The tool weighs 6½ lb and the kit includes accessories for nut-running and nut-removal, for drilling steel, masonry or wood, reaming, wire brushing, and equipment for applying and removing studs, tapping, driving and removing screws.

•

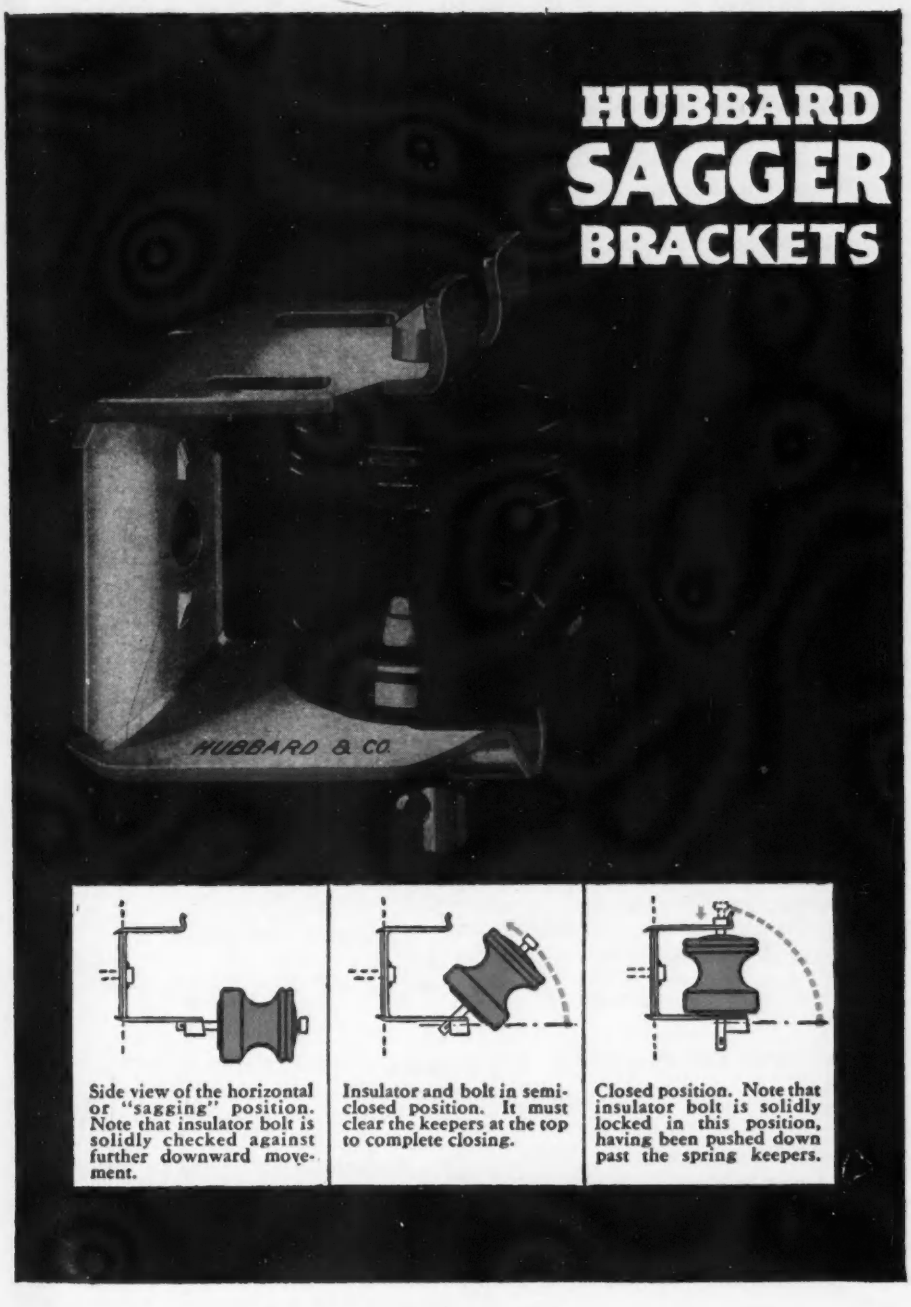
Sheathed Cable

A NON-METALLIC SHEATHED cable has been recently added to line of building wires and cables produced by Rome Cable Corp, Rochester, N. Y. Marketed under the trade name RoFlex, it is approved for 60 C operation and is manufactured in a popular range of sizes, both two and three conductors.

Individual paper wrapped conductors, insulated with Rome Synthinol thermoplastic compound, are colored for identification, as well as being highly resistant to oils, acids, alkalies, moisture, and flame. Impregnated jute fillers in each valley add longitudinal strength to the cable and serve as "rip cords" for stripping the outer braid of flame and moisture-resistant cotton.

Compared with non-metallic sheathed cable, manufactured with conventional rubber insulation, RoFlex is lighter in

Something **NEW** IN SECONDARY DISTRIBUTION

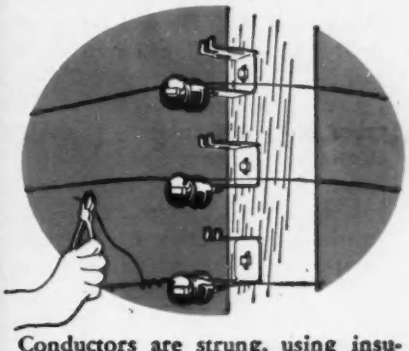


Side view of the horizontal or "sagging" position. Note that insulator bolt is solidly checked against further downward movement.

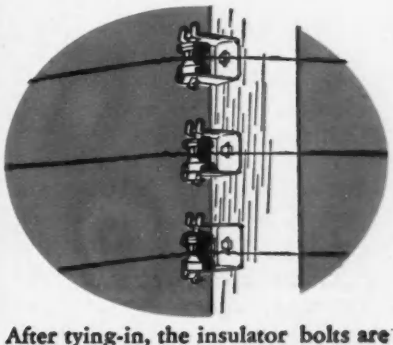
Insulator and bolt in semi-closed position. It must clear the keepers at the top to complete closing.

Closed position. Note that insulator bolt is solidly locked in this position, having been pushed down past the spring keepers.

Holes are drilled at correct spacing and machine bolt is inserted as shown.



Conductors are strung, using insulators as pulleys, until desired sag is obtained after which they are tied-in while still in the horizontal position.



After tying-in, the insulator bolts are raised to the vertical and dropped into the lock position.

For secondary distribution circuits, where a variety of problems are to be met, Hubbard No. 710 Sagger Bracket is the most flexible choice to meet the requirements. This Bracket may be described as a single, *separate,* secondary-rack point, which may be used with one or more similar points, at any desired spacing for any number of conductors.

No. 710 Brackets are versatile in other ways also. The patented feature is the arrangement of the insulator bolt which may be dropped to a horizontal position to allow the "sagging" of conductors with the insulator spool acting as a pulley. Insulator Bolts are locked in position when closed or open. Strength against line pull is provided by the broad back bearing against the pole, the backs being 3-inches in width. Spurs at the corners prevent the bracket from turning during and after installation. Bolt heads are trapped in the back to prevent turning while tightening.

Hubbard Sagger Brackets have been tested and proved in service. Highly adaptable to any conditions, they have drawn praise from engineers, in every instance of the many installations made to date.

HUBBARD AND COMPANY

PITTSBURGH · CHICAGO **OAKLAND · CALIFORNIA**

weight with uniformly smaller diameters, resulting in a saving of space in junction and outlet boxes.

•

Electron Tubes

A NEW GROUP of small electron tubes, known as the "Special Red" line, has been announced by Radio Corporation of America, Commercial Engineering Section, Harrison, N. J. First in the line are: RCA-5691, a high-mu triode; RCA-5692, a medium-mu twin triode; and RCA-5693, a sharp cutoff pentode.

Control applications for the small tubes include regulating temperature, starting, stopping and controlling speed of motors, and controlling lighting equipment. New tubes feature "girder" construction of internal elements, and offer resistance to shock and vibration, stability and longer life. Booklet RSB 1000 provides operating data.

•

Sagging Target

FOR SIGHTING and measuring line sag on line construction jobs a new device, called a sagging target, is manufactured by the A. B. Chance Co, Centralia, Missouri.

This target consists of a calibrated maple staff, with indented numbers, running from 1 to 6 ft down one side and from 6 to 11 ft up the other, and a movable sighting target painted with black stripes. A hook slot is notched into the staff for hanging the tool on the conductor. An extension which can be bolted to the sagging target to determine sags from 6 to 11 ft 4 in. is also available for measuring sag on line spans.

Sagging targets are used in pairs. When the sighting target has been adjusted to the desired amount of sag, one target is hung at each end of the span to be sagged. The lineman sights from one target to the other and when the sag loop is level with both targets, the conductor is sagged in accurately.

•

Electric Etcher

FOR MARKING NAMES, voltage, sizes, part numbers and other information on ferrous metals, Ideal Industries, Inc, Sycamore, Ill., has manufactured the "Universal" etcher. The model has four etching heats, 120, 240, 420 and 700 w, selected by a rotary switch; available for 115 and 230 v, 50-60 cycle circuits.

The unit is enclosed in a metal case for portability. When opened, the cover forms a work plate on which to place small parts for etching. The etching tool is reported to stay cooler because point is mounted in handle and cooling air may circulate around it. Cables and C-clamp are furnished.

•

Narrow Relay

SMALL CONTROL relay having dimensions 1⅝ in. long, 1-13/16 in. high, 15/16 in. wide, weight only 50 grams, is a new product of Allied Control Co, Inc, 2 East End Ave, New York 21, N. Y.

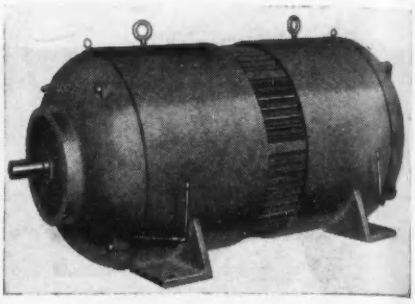
This type AS relay is rated 1 for a-c and d-c service. Contact arrangement is single pole, either normally closed, normally open or double throw; rating is 5 amp, 24v d-c or 110v a-c. Type AS is insulated from the frame. An adaptation, type AR, is identical but grounded to the frame.

•

Induction Motors

TYPICAL OF THE recently designed line of 2-pole, totally enclosed, fan cooled, squirrel-cage motors from 250 to 500, is the 350-hp, 3600-rpm motor illustrated, product of Burke Electric Co, Erie, Pa.

The motors are normal starting torque, low starting current type, suitable for full-voltage starting. They are



rated 55C rise continuous, and are available for 3 or 2-phase, 60-cycle, 440, 550, or 2300-v operation. They are especially designed for direct drive of high-speed blowers, pumps, compressors and similar equipment.

Windings are completely enclosed, and the bearing brackets and external fans are enclosed within an outer end shield which directs the flow of cooling air over the bearings and up through the radiators within the outer shell, discharging it at the center opening. Double-end ventilation is used to assure maximum uniform cooling. Split bearing brackets and split sleeve bearings are used to facilitate removal for inspection or overhauling.

Similar motors are available at speeds of 1800 rpm and lower, with either sleeve or ball bearings.

•

Oxygen Recorder

AS A MEANS OF checking combustion efficiency in furnace and boilers, Micromax oxygen-recording equipment has been developed by Leeds & Northrup Co, 4934 Stenton Ave, Philadelphia 44, Pa. All parts which have gas contact are made of glass. For that reason the equipment is said to be corrosion-proof and stable in calibration.

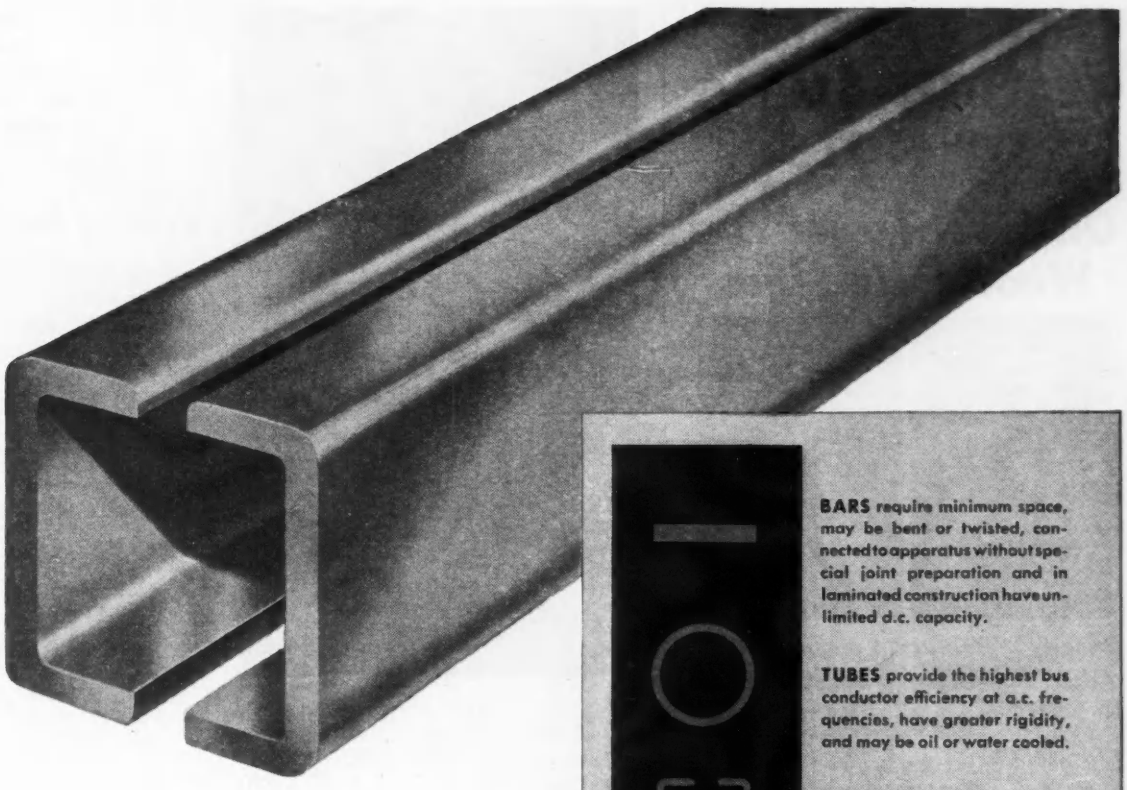
The recorder operates on the thermal conductivity principle. Analysis for oxygen is accomplished by the "hydrogen-difference" method, which consists of adding hydrogen to the gas sample, removing oxygen by combustion, and electrically comparing the conductivity of the sample before and after oxygen is removed.

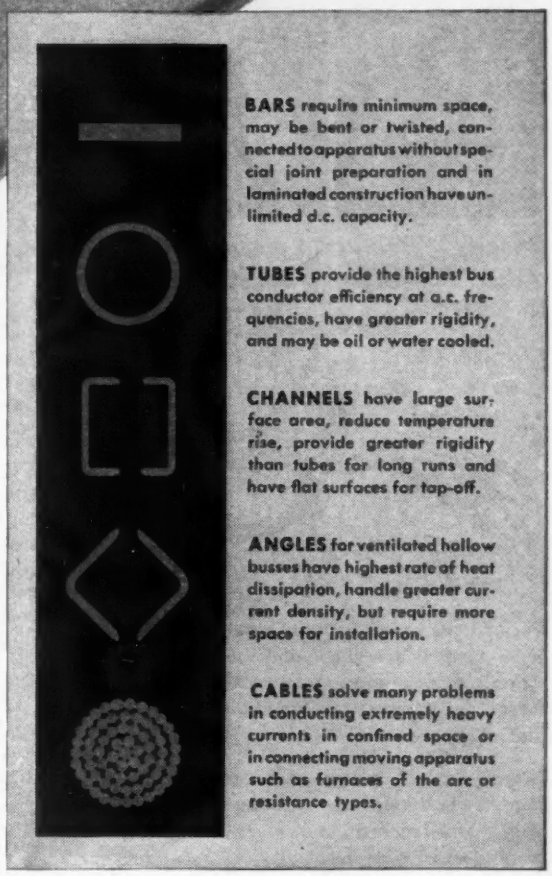
•

Circuit Breaker

A NEW HIGH-SPEED, quick-clearing (8 cycle), outdoor, frame-mounted oil circuit breaker, type FZO-151, has been announced by the Boston Works of the Allis-Chalmers Mfg Co. It is available in 69-kv ratings from 500,000 to 1,500,000 kva interrupting capacities.

The new unit includes all-welded steel fabrication throughout. By the design, "5-20" performance (circuit




BARS require minimum space, may be bent or twisted, connected to apparatus without special joint preparation and in laminated construction have unlimited d.c. capacity.
TUBES provide the highest bus conductor efficiency at a.c. frequencies, have greater rigidity, and may be oil or water cooled.
CHANNELS have large surface area, reduce temperature rise, provide greater rigidity than tubes for long runs and have flat surfaces for tap-off.
ANGLES for ventilated hollow busses have highest rate of heat dissipation, handle greater current density, but require more space for installation.
CABLES solve many problems in conducting extremely heavy currents in confined space or in connecting moving apparatus such as furnaces of the arc or resistance types.

Ventilated COPPER CHANNEL BUS

for rigidity, good distribution and low power losses

TWO COPPER CHANNELS arranged to form a hollow square tube with longitudinal ventilating slots vertically above one another offer many advantages.

Possessing greater rigidity than a round tube, they permit long spans between bus supports, and provide good current distribution at normal power frequencies with low power losses. The flat surfaces permit inexpensive tap-offs, the large areas dissipate heat, and the simplicity of arrangement makes for low installation expense.

Each of the five shapes in which Anaconda Bus Conductors are made offers advantages of its own. In all five shapes, Anaconda Copper provides the high thermal and electrical conductivity, strength, toughness and corrosion resistance which make *copper* the preferred material for Bus Conductors.

ANACONDA

Anaconda

BUS CONDUCTORS

THE AMERICAN BRASS COMPANY

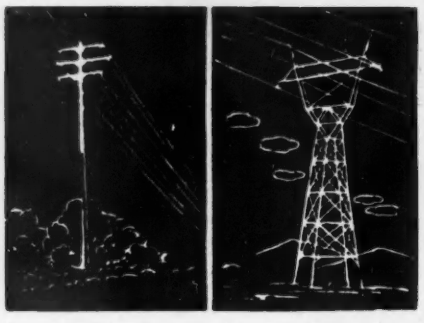
General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

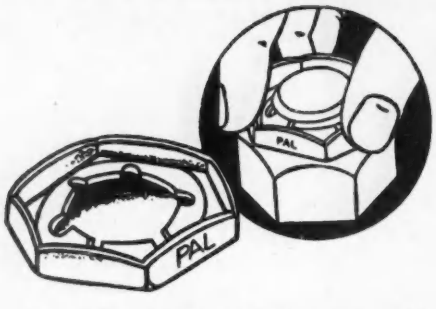
In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

ELIMINATE RE-TIGHTENING OF NUTS

On Steel Tower and Wood Pole Lines



Specify "Palnuts" on new lines
Add "Palnuts" to existing lines



For over 10 years, Double Locking "Palnuts" have been keeping bolt-and-nut assemblies tight on steel towers, wood pole lines, cross arms and braces, insulator pins, clevises and clamps.

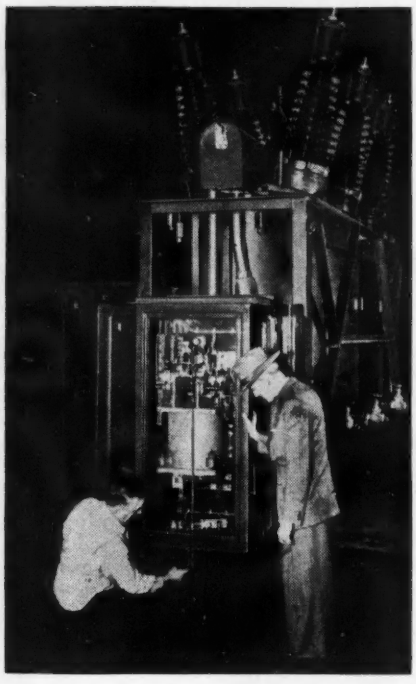
When applied on new installations, "Palnuts" save future checkups and re-tightening. Maintenance crews checking old installations can add "Palnuts" without disturbing regular nut. Only 3 bolt threads space are required. "Palnuts" are very low in cost; may be removed and reused. They are available in a full range of sizes, in Hot Dipped Galvanized or other finishes and materials used by the Utility industry.

SEND details of your needs for samples. Write for "Palnut" literature and detailed folder on power line applications.

THE PALNUT COMPANY

51 Cordier St., Irvington 11, N. J.

DOUBLE-LOCKING
PALNUTS
Trademark Reg. U. S. Pat. Off.



interruption within 5 cycles, reclosing service within 20 cycles) can be provided under specified conditions.

Included with this breaker are a special "Ruptor" interrupting device capable of ultra-high speed circuit interruption, a simplified high-speed electropneumatic or solenoid operator, both mechanically trip free, and an improved new design low-inertia, pole-unit mechanism. Using a standard portable tank lifter, one man can expose the simplified "Ruptor" contacts in three easy steps for maintenance check.

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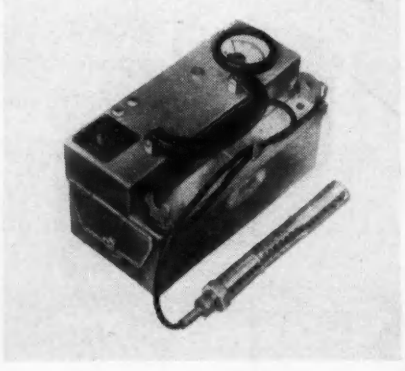
Radiation Meter

RECENTLY ANNOUNCED is a model MX-5 radiation meter, by Beckman Instruments, National Technical Laboratories, South Pasadena, Calif. It



is a portable Geiger-Muller counter weighing 9 lb, for the detection and measurement of X, beta and gamma radiations.

The meter is battery operated and has a self-quenching GM tube mounted on a 3-ft. probe. A selector switch gives three operating ranges, 20, 2 and 0.2 mr/hr. An external control is provided to compensate for changes in battery voltage. Instrument and tube are reported to be waterproofed.

•

Pressure Switch

FOR OPERATING RATES up to 300 per min on control circuits of welders, machine tools, and lubricating systems, a new pressure switch has been developed by Square D Co, Industrial Controller Division, 4041 North Richards St, Milwaukee 12, Wis.

Class 9012 has the spdt snap switch mechanism enclosed in a melamine case and the aluminum switch enclosures are said to be drip-tight and oil-resistant.

Switch action can be observed through a window. Trip point is adjusted by knob at top. Bellows-actuated types are available in ranges up to 1000 psi. Piston-actuated controls are suitable for pressures up to 3000 psi. Switch ratings with inductive loads: break 15 amp, 110 v, and 5 amp, 440 v, a-c; also 0.5 amp, 115 v and 0.25 amp, 230 v, d-c.

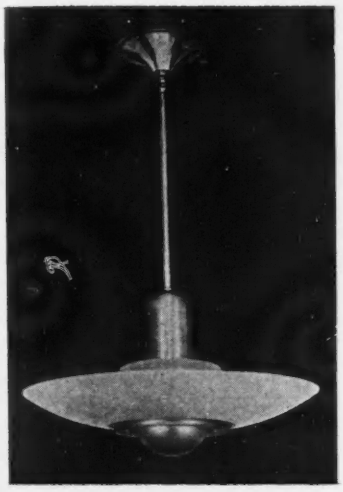
MORE NEW PRODUCTS
about which you should know

De-Tec-Tronic Laboratories, Inc, Chicago 10, Ill., offers the Sentry, an **announcer unit** consisting of a photoelectric eye and mirror for operation with bells, meters, motor control or other devices. . .Holcomb and Hoke Mfg Co, Indianapolis, Ind, has a **fan** package consisting of suction chamber, automatic outlet shutter, motor and fan for capacities 4,200 to 19,900 cfm. . . Sola Electric Co, Chicago 50, Ill., announces a 200-ma **transformer** engineered for fluorescent lamps of long, slim design.

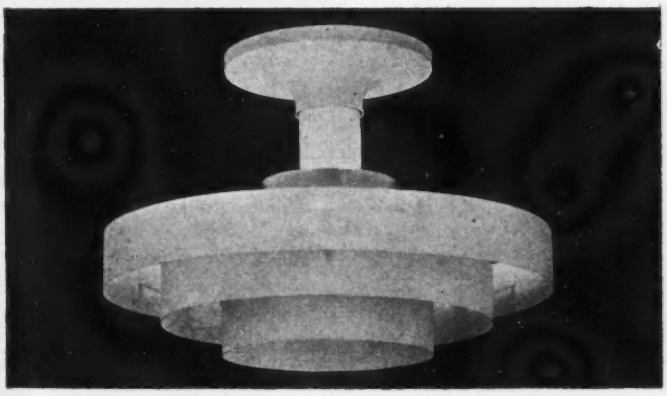
Raytheon Mfg Co, Waltham, Mass., introduced a packaged **precipator** with blower and washer, capacities 1200 to 1500 cfm and 1800 to 2250 cfm. . . Lincoln Electric Co, Cleveland 1, Ohio, has a **carbon arc torch** for use with a-c welding machines; copper coated carbon electrodes $\frac{5}{16}$ or $\frac{3}{8}$-in. diam. are clamped in aluminum alloy jaws. . . Manco Mfg Co, Bradley, Ill., announced a **manual cutter** for wire and mild steel bolts up to $\frac{1}{4}$ in.

Westinghouse Electric Corp, Pittsburgh 30, Pa. has the Safe-Temp, a **tank control** to shut off power automatically if water temperature exceeds 180-205 F. . .Lux Clock Mfg Co, Water-

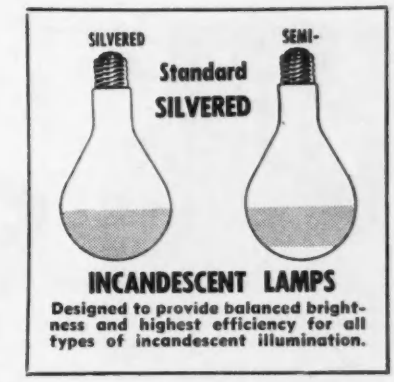
incandescent *integrated lighting...by* fluorescent



210 PL:
Luminous indirect lighting. The Silvrny line encompasses a large variety of designs to satisfy commercial, residential or industrial applications.



THE NEW 711 LINE
Designed for good lighting. All Silvray Luminaires have incorporated numerous "plus" features which assure fine illumination. High light output and distribution are combined with the Silvray method of Brightness Modification—designed to inexpensively provide brightness limitations in varying degrees.



INCANDESCENT LAMPS
Designed to provide balanced brightness and highest efficiency for all types of incandescent illumination.

Silvray *for . . .* PLANNED LIGHTING

The Silvray principle of Integrated Lighting, either incandescent or fluorescent, provides every essential of good light distribution in the following three classifications. . . .

Light for Seeing—embraces the applications for such visual tasks as are usually found in offices, schools, hospitals, etc., wherein eye comfort for sustained periods is important.

Light for Selling—includes those applications wherein illumination is used to create eye-appeal in the merchandising of goods—where high brightness contrasts are deemed preferable in order that merchandise be "accented".

Light for Homes—to provide every room in the house with comfortable, eye-saving, soft illumination, free of glare and perfect for every home use or relaxation.

THE 1500 LINE:
Combines simplicity with modern styling and offers a wide flexibility in applications. With the Silvered Bowl Lamp, it provides totally indirect illumination; with the Semi-Silvered Bowl Lamp, provides Light for Selling applications.

All Silvray Fixtures are covered by U. S. Basic and Design Patents

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DISCONNECTING & LOWERING
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Put an END to Dangerous "In-the-Air" Lighting Fixture Cleaning and Relamping OUTDOOR—INDOOR

THE modern Thompson Hanger eliminates the old "up-in-the-air" method of cleaning and relamping which is both dangerous and expensive.

By this method the work is done at ground level, easier—faster—at lower cost and with complete safety as there is no electrical, climbing or ladder hazards.

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We invite you to use the
THOMPSON ENGINEERING SERVICE

THOMPSON
DISCONNECTING & LOWERING
HANGERS

THE THOMPSON ELECTRIC CO.
1101 POWER AVENUE • CLEVELAND 14, OHIO

bury, Conn, added to its line an **interval timer** spring wound, Minute Meter Series 1500, for time ranges 0-30, 60 and 120 min, having capacities 20 amp 110 v, 10 amp 220 v, and ¼-hp rating. . .Harnischfeger Corp, Milwaukee 14, Wisc., has a **truck crane** for pile driving, featuring separate engines for travel and crane service, and having push-button control for steering, shifting, starting and stopping.

General Electric Co, Schenectady 1, N. Y. announced a recording **mass spectrometer** capable of measuring over the mass range from 1 to 350, for the chemical analysis of gases and vapors in the fields of atomics, nucleonics and ionics. . .Falk Corp, Milwaukee 8, has three sizes of **backstops** to prevent reverse rotation, by a wedging action of pawls against the housing bore; applications are winches, windlasses and conveyor drives.

Federal Electric Products Co, Newark, N. J., has designed the Noark **motor starters** with renewable solid silver contacts. . .Cummins Portable Tools, Chicago 40, Ill., announced a model 200 portable, a-c or d-c operated, ½-in. **drill,** also rated for 1-in. bits when drilling wood. . .Lipe-Rollway Corp, Syracuse, N. Y. has a Hand-I-Hack power **hack saw** which can be carried with one hand to the job; operates from a 110-v, a-c outlet.

Bell Electric Co, Chicago 8, Ill., has a Speedmont 500 duplex **receptacle** which can be installed by adjustment of screws in clamps attached to mounting yokes. . .American - LaFrance - Foamite Corp, Elmira, N. Y., announces a carbon dioxide **fire extinguishing system** which sounds an alarm, automatically shuts off power units, closes windows and doors when fire strikes. . .American Molded Products Co, Chicago 22, Ill., offers solidly based one-piece **fuse clips** in 1, 2, 3 and 4-fuse banks for 3 AG fuses.

T. C. Smith Mfg Co, Springfield, Ill., is marketing a shaded-pole **induction motor,** 20 w, 115 v, 60 cycles, 75 in.-oz, 20 rpm, with magnetic clutch and tapped studs for bracket mounting. . . Price Electric Corp, Frederick, Md, developed for communication service, a hermetically sealed **midget relay** with coil resistances up to 9500 ohms and contact combinations up to 4pdt. . . Connecticut Hard Rubber Co, New Haven 9, Conn, has an extruded sealant, a **silicone rubber sponge,** suitable for ovens where temperature is up to 500 F, also for vibration dampener.

C-B Tool Co, Lancaster, Pa, has introduced a 4-watt **germicidal lamp** for small area cabinets. . .Cowhig Industries, Boston 16, Mass, introduced an aluminum case with a 6-ft, snap back, **flexible rule** illuminated by a flashlight.

NEWS ABOUT PEOPLE

Colorado Utility Elects Two New Vice-Presidents

Announcement has been made by the Colorado Central Power Co, Englewood, of the election of Lee R. Jones to the position of vice-president in charge

L. R. JONES

of construction operations and of J. E. Wilson as vice-president in charge of planning, engineering and public relations.

Mr Jones started with the Colorado Central utility in 1933 as a line foreman in the Fort Lupton district and was advanced to the position of district operating superintendent in 1935.

J. E. WILSON

After serving in that capacity during the period of the company's expansion in irrigation power development, he was promoted to district manager. In 1945 he was transferred to the Arapahoe district at Englewood as district manager.

Mr Wilson obtained his early utility experience with the Inland Utilities Co at Elk City, Okla., and with the Southwestern Light & Power Co (now southwestern division of Public Service Co of Oklahoma). It was in 1935 that he became identified with the Colorado Central Power Co as superintendent of the Arapahoe district. Promoted to superintendent of operations in 1938 he served in that capacity until his recent promotion.

•

Bassett Elected President Of Acme Wire Co

H. B. BASSETT

Herbert B. Bassett, formerly vice-president of the Acme Wire Co, New Haven, Conn., has been elected president to succeed Thomas G. Nee, who was elected to the new office of chairman of the board. Brower Hewitt, formerly treasurer, was elected vice-president and treasurer.

Following graduation from the University of Michigan and design and production experience with Westinghouse Electric Corp in Pittsburgh, Mr Bassett joined the Acme Wire Co organization with which he has been associated for 28 years.

After spending eight years as a salesman for Acme in the Chicago area, Mr Bassett went to the home office in New Haven, first as assistant sales manager and then as sales manager. He has been a vice-president since 1941 and last spring became a director.

Hobson Heads Research Institute at Stanford

Dr J. E. Hobson, director of the Armour Research Foundation of the Illinois Institute of Technology, has

J. E. HOBSON

been named director of the Stanford Research Institute, succeeding Dr William F. Talbot, who resigned to enter private industry.

A graduate of Purdue University and holder of a PhD degree from the California Institute of Technology, Dr Hobson received the Eta Kappa Nu award in 1940 as "The Outstanding Young Electrical Engineer of the United States." He was director of the department of electrical engineering at the Illinois Institute from 1941 to 1944, when he was appointed director of the Armour Foundation.

Following his doctoral work at Caltech, Dr Hobson spent two years as an instructor in electrical engineering at Armour Institute of Technology, then became central station engineer with the Westinghouse Electric Corp. During his four years with Westinghouse, he also was lecturer in engineering at the University of Pittsburgh.

Dr Hobson has served on various committees of the American Institute of Electrical Engineers and at the present time is chairman of the Chicago section. He is also chairman of the program committee of the Western Society of Engineers and a member of the board of directors of the National Electronics Conference of which he was first president in 1944 when the conference was started. He is also a member-at-large

of the division of engineering and industrial research of the National Research Council. He is co-author of a book entitled "Power Transmission and Distribution" and has written for ELECTRICAL WORLD and ELECTRICAL WEST, both McGraw-Hill publications, and other electrical publications.

•

Louis Allis Co Makes New Executive Appointments

Expanding operations of the Louis Allis Co., Milwaukee, has resulted in the formation of three new offices. Elected

L. ALLIS, JR

to these new offices are Louis Allis, Jr, vice-president in charge of sales; Frank O. Kovich, vice-president in charge of manufacturing and T. R. Wieseman, vice-president in charge of engineering.

In addition to these elections, C. G. Skidmore has been appointed sales

F. O. KOVICH

manager; James H. Daganhardt, chief engineer and John J. Kirkish, chief of electrical design.

Mr Allis has been with the company 10 years, this period of time being interrupted by more than two years in military service and also with WPB.

T. R. WIESEMAN

Prior to joining Louis Allis, Mr Kovich was assistant general works manager of six plants for a large agricultural equipment company. Before his recent promotion he was works manager for Louis Allis.

Mr. Wieseman has been closely identified with the company's engineering problems during his 22 years association with the organization. He was occupying the position of chief engineer at the time of his recent promotion.

Formerly chief supervisory engineer, Mr Daganhardt has been connected with the company's engineering department for 22 years in many capacities. Mr Kirkish has been associated with the company's design engineering since 1937. Mr Skidmore was formerly assistant sales manager of Louis Allis. Prior to military service, he was chief of the electrical control section of WPB, and previous to that, was connected with a control company.

OBITUARY

Herbert L. Rawlins

Herbert L. Rawlins, manager of protective devices engineering in the switchgear and control division of Westinghouse Electric Corp at East Pittsburgh, Pa., died on Feb 17. Mr Rawlins had been active in Westinghouse for many years in the development of fuses, disconnecting switches, and air circuit breakers and for the past four years, engineering manager of the protective devices engineering department.

Born in 1901 in Du Quoin, Ill., Mr Rawlins was granted his B.S. degree in EE by Ohio State University and later his masters degree. It was in 1943 that he became manager of protective devices engineering. A member of the American Institute of Electrical Engineers, he had written many technical papers on fuses and circuit breakers during his career and at the time of his death held 40 patents.

•

Charles I. Burkholder

Charles I. Burkholder, vice-president and chief engineer of the Duke Power Co, Charlotte N. C., whose death was recently announced (EW, Mar 20, p 13), was a pioneer in hydroelectric and transmission line development. In the course of his distinguished engineering career, he rendered invaluable service to the rapid growth of the Carolinas.

Mr Burkholder was born at Sterling, Ill., and was graduated from the University of Wisconsin. He obtained his early experience with the General Electric Co at Schenectady. It was in 1906 that he became associated with the late William States Lee, chief engineer of

CHARLES I. BURKHOLDER

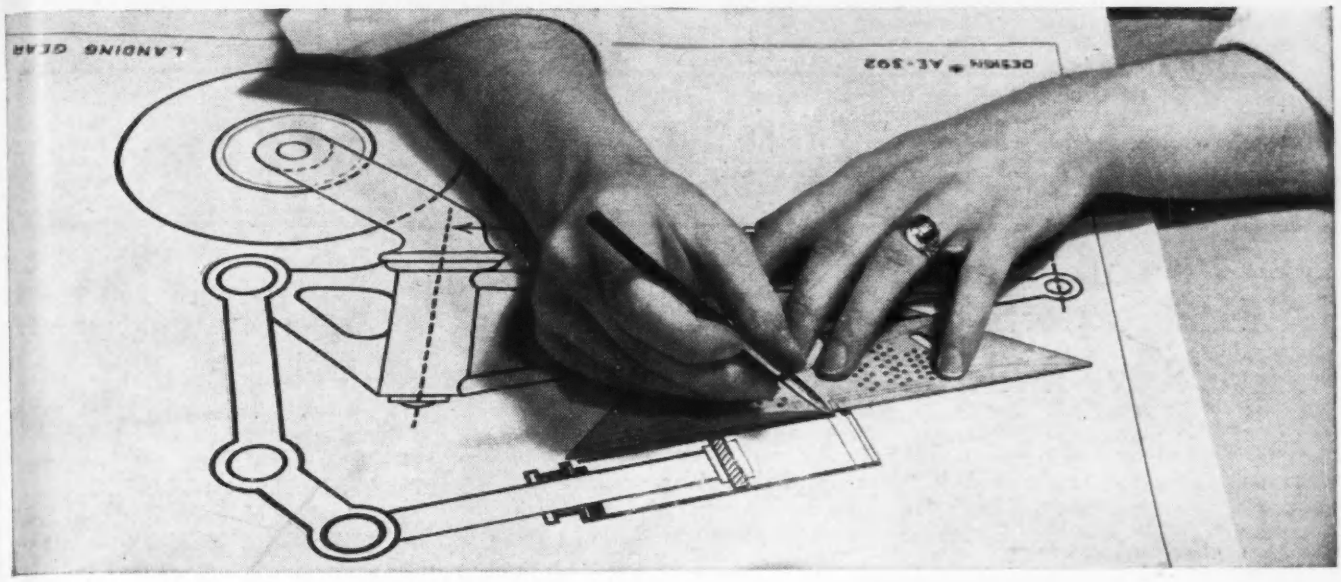
the Southern Power Co, predecessor of the Duke Power Co.

In 1935 he was made chief engineer of the Duke Power Co and last year he was elected to a vice-presidency.

Mr. Burkholder was a fellow of the American Institute of Electrical Engineers and a member of the American Society of Mechanical Engineers.

•

► WILLIAM L. PUFFER, 87, died at Laconia, N. H., on March 8. Born in South Sudbury, Mass., he was long an associate professor at the Massachusetts Institute of Technology. Later he maintained an office at Boston as a consulting electrical engineer. He was also active in the illuminating field and for some time lectured at the Lowell Institute and Wells Memorial Institute, Boston.



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MANUFACTURERS and MARKETS

Annual Reports of 4 Manufacturers Reveal Increased Sales and Profits

Annual financial reports of four electrical manufacturers just released indicate that 1947 was a busy and profitable year. Sales were at a high figure and profits, though not in step with sales, were not too far behind. The significant information revealed by the reports follows:

General Electric Co—Net sales of $1,330,776,375 represented a physical volume of output more than double that for the pre-war peak year of 1940. For the parent company and its consolidated affiliates, net profit available for dividends was $95,298,940, or $3.30 a share of common stock. Previous record earnings, realized by the parent company in 1929 on a sales volume of only $415,300,000, were equivalent to $2.24 a share of present common stock. The 1947 profit rate on each dollar of sales was equivalent to 7.2 cents. This was 38% less than the average rate of 11.6 cents earned in the eight-year period ended with 1941.

At the end of the year, there were 197,324 employees on the payroll—an average of 185,696 for the year. Total employee earnings were $559,756,000, a record high. Wages of individual employees also reached a new high—the annual average was $3,014.

Inventories for all GE companies at the end of 1947 totalled $345,227,270, an increase of 25% during the year. This was a record high. However, inventories were equivalent to only 25.9% of sales in 1947, compared with an average ratio of 23.9% for the 13 years ended with 1946.

Net book value of plant and equipment at the close of 1947 was $195,928,671, compared with $123,748,553 a year earlier.

At the end of 1947, GE had 125 plants in 90 cities and 22 states. This was exclusive of facilities operated for the U. S. government.

Allis-Chalmers Manufacturing Co—Net sales for 1947 were $211,949,890 as compared with $93,840,030 for 1946, when strikes took place at seven of the firm's eight plants. The 1947 billing represents a record peace-time sales volume. Foreign business for the year amounted to approximately 14%, which corresponds to average export sales in previous years.

Net profit was $5,422,308, equal to $1.69 a common share after preferred dividend requirements and provision of $3,650,000 for federal income taxes. The 1946 profit was $144,487.

The backlog of orders increased during 1947 from $105,208,676 to $169,553,221. This figure applies only to the products of the general machinery division since the sales of the tractor division are not booked until shipment.

Sylvania Electric Products Inc—Net sales of $95,715,638 for 1947 set a peace-time record. In 1946, sales were $69,313,127. Net income for the company and its wholly owned subsidiaries was the highest of record, $2,507,075. After provision of $397,414 for preferred dividends, these earnings were equal to $2.10 per share. In 1946, net income was $2,384,017 or $1.97 per share.

Sales of the international division increased 150% to $7,250,000. A decline is expected this year because of the dollar shortage.

Two recently acquired subsidiaries, Colonial Radio Corp and Wabash Corp, operated at a loss as did the electronics division. Profitable operations are expected in 1948.

Wagner Electric Corp—Net sales for 1947 were $70,250,934, highest in history. Sales in 1946 were $44,442,767. Net income, after taxes and overhead reserves, amounted to $6,313,934 or 8.98% of the total sales. Of this amount, $1,882,819 was paid out in dividends. At the end of the year there were 489,231 shares of common stock outstanding.

ELECTRIC WATER HEATERS are hydrostatically tested at the new Milwaukee plant of Hotpoint, Inc. The plant also manufactures automatic dishwashers

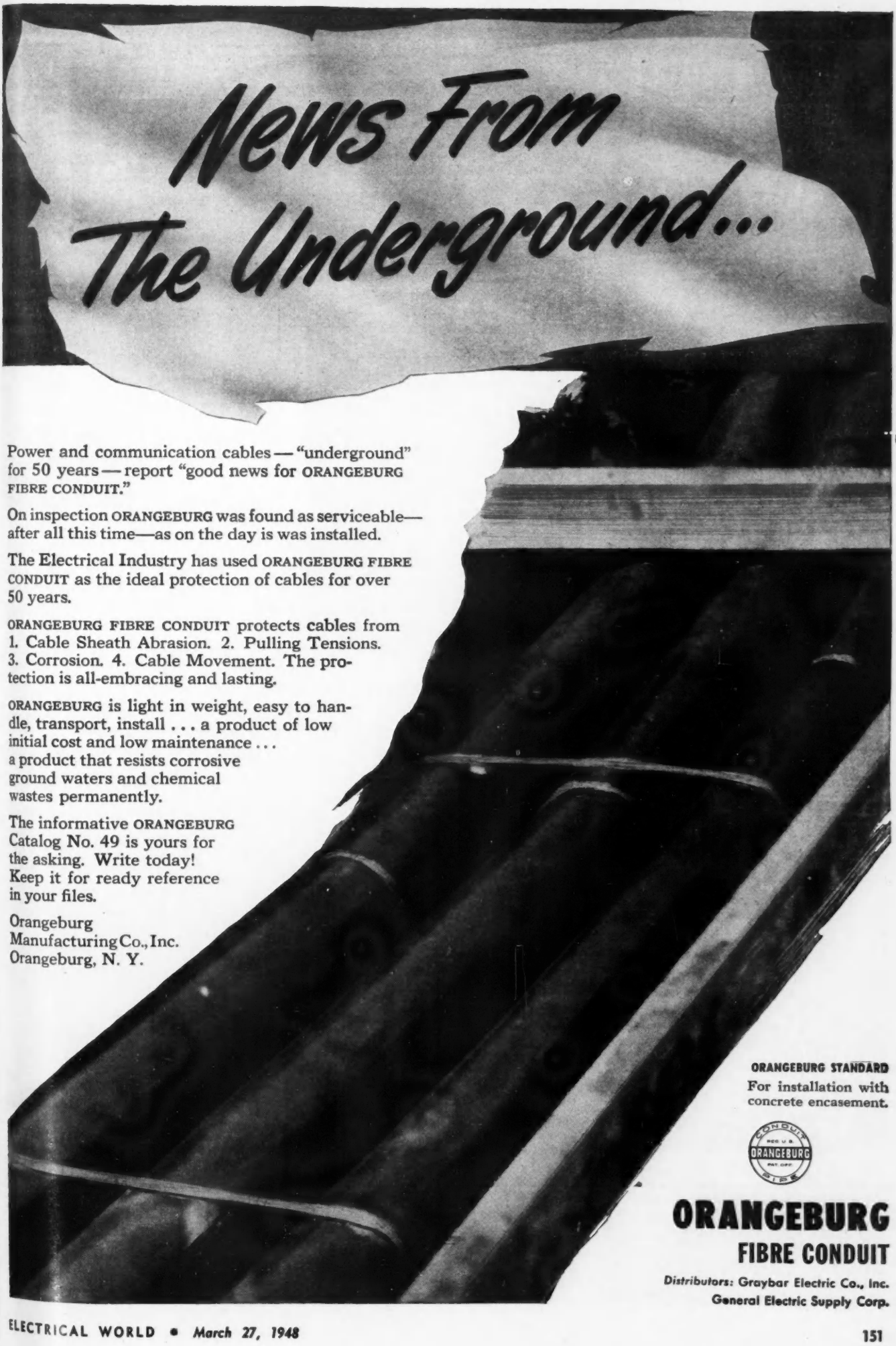
•

Great Lakes Carbon Buys Carolina Plant from WAA

Great Lakes Carbon Co, New York, has announced the purchase of the National Carbon Co plant near Morganton, N. C., from the WAA for $2,000,000. The plant was built during World War II at a cost of between $8,000,000 and $9,000,000.

The plant manufactures electrodes, which now are being disposed of to the Atomic Energy Commission. Richard McAvoy, counsel for Great Lakes Car-

News From The Underground...



Power and communication cables — "underground" for 50 years — report "good news for ORANGEBURG FIBRE CONDUIT."

On inspection ORANGEBURG was found as serviceable—after all this time—as on the day is was installed.

The Electrical Industry has used ORANGEBURG FIBRE CONDUIT as the ideal protection of cables for over 50 years.

ORANGEBURG FIBRE CONDUIT protects cables from 1. Cable Sheath Abrasion. 2. Pulling Tensions. 3. Corrosion. 4. Cable Movement. The protection is all-embracing and lasting.

ORANGEBURG is light in weight, easy to handle, transport, install . . . a product of low initial cost and low maintenance . . . a product that resists corrosive ground waters and chemical wastes permanently.

The informative ORANGEBURG Catalog No. 49 is yours for the asking. Write today! Keep it for ready reference in your files.

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For installation with concrete encasement.

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Distributors: Graybar Electric Co., Inc.
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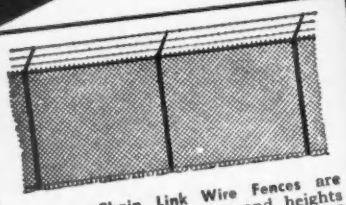
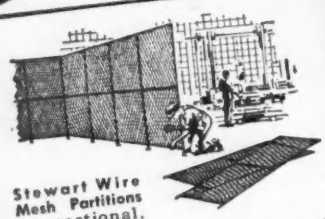
STEWART FENCES AND METAL SPECIALTIES

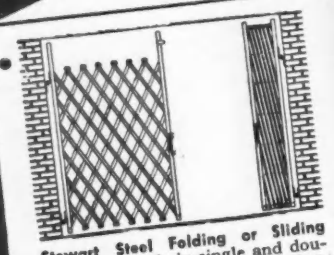
Stewart Wire and Iron Products include many items which are used extensively in the electrical field. Three are illustrated. Others are Iron Picket Fences and Gates; Wire and Iron Window Guards; Machinery Guards; Pipe Railings; All Steel Settees, etc.



Stewart Chain Link Wire Fences are made in several weights and heights to meet all requirements. Style 3TH is shown above. Also made in style 5TH (5 strands of barbed wire) and 0TH, without barbed wire overhang.



Stewart Wire Mesh Partitions are sectional, and made to fit any space. Give all measurements when writing for information.



Stewart Steel Folding or Sliding Gates are made in single and double construction to fit any opening.

Literature sent on request. When writing please mention products in which you are especially interested.

The Stewart Iron Works Co., Inc.
1566 Stewart Block Cincinnati 1, Ohio
Experts in Metal Fabrications Since 1886

Stewart IRON and WIRE FENCES

bon, stated National Carbon would continue to operate the factory through 1948 and afterward would have options for two more six-month leases. He said if National does not exercise the options Great Lakes would take over the plant and operate it.

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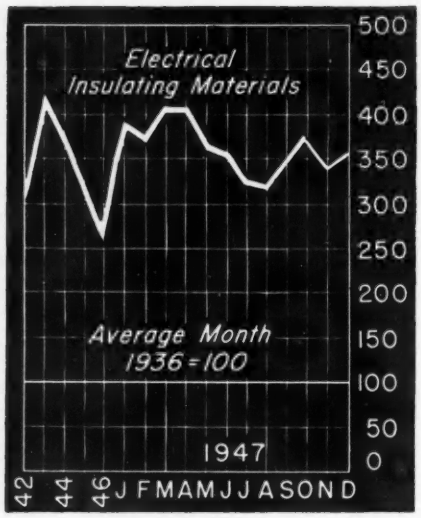
Insulating Material Sales Rise Slightly in December

Sales billed on electrical insulating materials during the month of December 1947 moved slightly upward from



those recorded in November, according to the index compiled by the National Electrical Manufacturers Association. The index advanced to 353 from 345 in November, an increase of 2%.

In December 1946 the index stood at 337, this year's figure representing an increase of 5%.

•

Guarantees Prices Again

Announcement has been made by The Wiremold Co, Hartford, that prevailing prices on Wiremold raceway, Wiremold fittings and Wiremold fluorescent lighting equipment are guaranteed for the second quarter of 1948. The company had guaranteed prices on August 8, 1947, for the balance of that year, and in December guaranteed prices through the first quarter of 1948, at the same time announcing a reduction of from 10 to 20% in the prices of certain Wiremold lighting units.

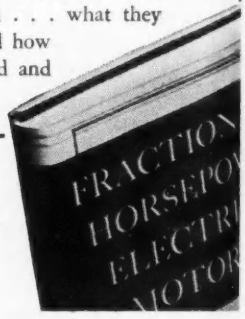
•

Locke Changes Name

In view of the broadened scope of products and fields of application, which have been developed within the past few years, the Locke Insulator Corp, Baltimore, has changed its name to Locke Incorporated.

HOW TO
• operate
• maintain
• and repair
SMALL MOTORS

This fact-packed handbook provides on-the-job reference for repair men, operating engineers, maintenance men . . . *anyone handling fractional horsepower electric motors.* It shows you what types and kinds are available . . . what makes them run . . . what they will do . . . and how to repair, rewind and connect them.



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by Cyril G. Veinott

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UTILITIES

Proposed Construction

Fla., Green Cove Springs—U. S. Navy, Bur. Yards & Docks, Wash. D. C., D. C. electric power plant. Plans deposit $10.

Maine—U. S. Eng., New England Div., Bldg. 21, U. S. Naval Drydock, South Boston, Mass., furnishing, installing equip. for diesel-electric generating plant, and f.o.b. railroad cars at Limestone, for Limestone Army Airfield, Serial No. 158.

Montana and North Dakota—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., f.o.b. cars at shipping point or f.o.b. cars at Wiota (Fort Peck), Wolf Point, Circle, Glendive, and Miles City, Mont., Williston, Beulah, N. D., 1 carrier-current telephone transmitter-receiver set, coaxial, carrier-frequency cable, carrier-current bypass assembly, 115,000 bolt coupling capacitors, carrier-current line traps, etc., Spec. 2164. Plans deposit $1. Walker R. Young, Denver, ch. engr.

Nebraska — Dawson County Public Power Dist., Lexington, 400 mi. distr. lines Dawson Co. **$675,000** REA allot. Raymond H. Reed & Co., Columbus, consult engrs.

N. Y., Dunkirk—Buffalo Niagara Electric Corp., Electric Bldg., Buffalo, filling lagoon for 1st unit steam electric plant. Total est. **$17,000,000.**

North Dakota—Cass County Electric Corp., Kindred, 375 mi. rural distr. lines, Cass Co. **$600,000.** REA allot. Ulteig Eng. Co., Fargo, consult, engr.

Pa., Johnsville—SUB-STATION—Pub. Wks. Office, Phila. Naval Base, outdoor sub-station, outdoor switching station, indoor sub-stations alterations. Spec. 19372.

S. D., Arlington—City, S. C. Ness, Aud., furnish labor and materials for municipal power plant, power plant wiring, switchboard and accessories, extens. to outside electrical sys., furnish and erect diesel engines, generators, exciters, auxiliary equip. and power plant heating. $100,000. G. M. Orr Engr. Co., 1004 Marquette Ave., Minneapolis, Minn., engr.

S. D., Vermillion—State B. Regents, Pierre, power plant at University of South Dakota. $150,000. Hugil Blatherwick & Fritzel, 367 Boyce Greeley Blk., Sioux Falls, archts.

Texas—U. S. Eng., P. O. Box 1229, Galveston, emergency generator control and dam power distr. board. Whitney Dam, Brazos River. Inv. No. W-41-243-eng-48-254.

Tex., Galveston—Galveston Co., Theodore R. Robinson, judge, Courthouse, Galveston Tunnel Proj. under Galveston Harbor Channel, across Bolivar Rd., Ventilation bldg. and transition island, Contr. 3-2, $8,000,000 trestle, Contr. 3-3, $750,000; approach roads and toll booths, Contr. 3-4, $300,000; electrical, Contr. No. 3-5, **$450,000**, ventilating facilities, $400,000. Plans deposit $50 each. Palmer & Baker, Staples-Pake Bldg., Mobile, Ala., consult. engrs., C. C. Washington, county engr.

Tex., Robard (San Antonio P. O.)—Robards Twp., c/ Henry A. Robards, Majestic Bldg., San Antonio, electric lighting sys. **$75,000;** natural gas distr. sys. **$100,000.**

Wash., Seattle—University of Washington, Henry Bldg., Zone 1, rein.-con. boiler house, piping, coal conveyor and electrical wiring for steam generating plant. $700,000. Lincoln Bouillon & Assoc., 1411 4 Ave., Bldg., Zone 1, engrs.

Wash., Seattle — City, County-City Bldg., 3 and James Sts., Zone 4, voted bonds March 9, imprv. and extens. of street lighting sys. **$4,000,000.** C L. Wartelle, city engr.

Low Bidders & Contracts Awarded

Arizona—Bureau Reclamation, Dtp. Interior, Denver Federal Center, Denver, Mar. 11, steel transmission line towers and appurtenances for 230 kv Davis-Parker transmission line, Spec. 2115 from Bethlehem Pacific Cost Steel Corp., 20 and Illinois Sts., San Francisco. **$470,941.** f.o.b. San Francisco.

Ind., Columbia City—Bd. P. Wks., E. C. Binder, chn., brick, rein-con., structural steel municipal power plant addn., to Fred Carey, South Whitley, **$143,955.** Est. $150,000. Bids 2/23.

Ia., Cedar Falls—City, light plant imprvs., to Jens Olesen & Sons, Constr. Co., 321 W. 18 St., Waterloo. **$127,300.** Bids 2/25.

Neb., Franklin—City, electric plant expans. to Buckeye Machine Co., Lima, O. **$90,000.**

Tex., Dallas—Dallas Power & Light Co., Dallas Power & Light Bldg., electric power feeder line **$100,000;** transformer station, **$80,000.** Nortwest section of city. Own forces.

Wash., Tacoma—Port of Tacoma, Transit Shed No. 1, Pier No. 2, March 9, cold storage plant addn. from J. G. Watts Constr. Co., 2315 Western Ave., Seattle. **$723,533.**

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Ark., Fort Smith—Campbell Soup Co., 2550 W. 35 St., Chicago, Ill., canning plant. **$15,000,000.**

Del., Newark—Newark School Bd. plans by E. W. Martin, 830 West St., Wilmington, elementary school. **$709,000.**

Ill., Chicago — University of Chicago, 956 E. E. 68 st., 7 story, brick, concrete, steel Nathan Goldblatt Memorial Hospital, $1,000,000. Schmidt, Garden & Erikson, 104 S. Michigan St., archts.

Ia., Cedar Rapids—Bd. Educ., Cedar Rapids, voted **$2,500,000** bonds, school construction.

Mich., Detroit—Jewish Hospital Assoc., 51 W. Warren St., hospital bldg. and boiler house, $2,210,000. Albert Kahn, Assoc., 345 New Center Bldg., archt.

N. Y., Bayside—George Ibkyan, c/o George B. Post & Sons, archts., 101 Park Ave., New York, Zone 17, hospital at 216 St. near 31 Rd. **$1,000,000.**

Ore., Corvallis—State Bd. Higher Educ., University of Oregon, Eugene, 230 x 260 ft. rein.-con. pavilion, Oregon State College. $1,500,000. Jones and Marsh, Concord Bldg., Portland, archts.

Tenn., Oak Ridge—City, Oak Ridge, 450 family apartments, 30 two and three story apartments. $5,000,000. Skidmore, Owings & Merrill, 100 W. Monroe St., Chicago, Ill., engrs. and archts. L. H. Jackson, chief, Operations Sect. P. O. Box 365, city mgr.

Tex., Dallas—Dunlap-Swain Co., 2000 Pacific St., 5 story, steel, concrete, masonry automobile parking garage and superservice station, Pacific, Elm, Harwood and Olive Sts. **$1,150,000.**

Wash., Seattle—University of Washington, Henry Bldg., Zone 1, languages bldg. **$750,000.**

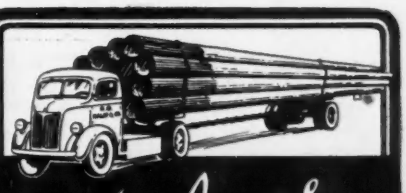
Wyo., Thermopolis—Lester W. Carter, I. P. Walton, Corbett Mills c/o Frederic Hutchison Porter, engr. and archt., 2120 Central Ave., Cheyenne, 2 story 100 room hotel. **$1,000,000.**

Low Bidders & Contracts Awarded

Conn., Newtown—State, F. R. Zeller, comptroller, 114 State Capitol, Hartford, brick, steel and concrete, hospital (mental) for disturbed women patients, to Frouge Constr. Co., Inc., 74 Goodsell St. Bridgeport. **$1,189,000.**

Ga., Columbus—J. A. Kerven Co., Mar. 5, department store, from Williams Constr. Co. 1032 13 St. **$742,000.**

Ia., Sioux City—City, Mar. 5, municipal auditorium, from H. S. Holtze Constr. Co., 2121 E. 4 St., **$1,060,740.** Est. **$1,300,000.**



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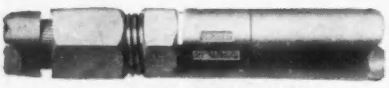

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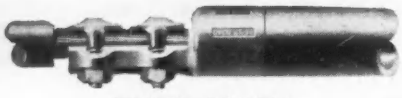

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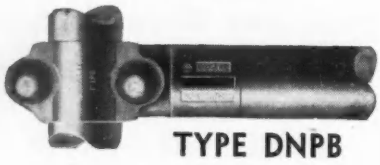

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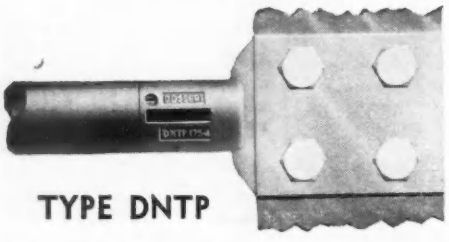

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BOOK REVIEWS

Industrial Applications of Infrared. By James D. Hall. Published by McGraw-Hill Book Co, New York, N. Y., 200 pages, illustrated. Price $3.50.

Covers the use of radiant heating in fields of metal working, wood finishing, textiles, paints, paper, plastics, ceramics and other applications. Describes available equipment and discusses its operating characteristics. Design and installation information is included so that the reader may apply infrared to his own heating problems. Essentially a book of practice, not of theory.

Power System Stability. Vol. II. By S. B. Crary. Published by John Wiley & Sons, Inc, New York. 329 pages, illustrated. Price $6.

The prior volume treated steady-state stability; this one deals with the transient aspects. Together the two are the summarization of what has evolved since about 1924 in evaluating the loadability of machines and systems in terms of stability. Now that lines are largely emancipated from lightning interruptions and fast fault-clearing has been achieved, the aim of economical investment will focus more critical attention on stability limits. Prevailing stringency of capacity thus makes this two-volume analysis a most timely one. Anyone concerned with getting the most out of existing interconnected systems or of getting the most load-carrying ability out of projected patterns can hardly ignore the practical interpretations of stability theory as set forth so intelligibly in the companion volumes.

Control Charts. By Edward S. Smith. Published by McGraw-Hill Book Co, New York. 161 pages, illustrated. Price $3.

Emphasis is placed on the practical application of statistical quality control rather than on the mathematical background of the methods that lead to improved product at lowered cost. Probability and frequency distribution are explained by simple examples. How poor workmanship, a faulty machine or inferior material can upset quality is similarly analyzed, in somewhat extensive detail. It is shown that inspection for attributes leads to three dominant and illuminating charts; (1) fraction defective, (2) number of defectives, and (3) number of defects. A final chapter takes up the formulas of standard practice previously discussed in terms of charts and chart construction. The author contrasts gage control with chart control and says the latter aims to determine how good a process can become before it is economically unsound to try and improve it.

Theory and Application of Microwaves. By A. B. Bronwell and R. E. Bean. Published by McGraw-Hill Book Co, Inc, New York 18, N. Y. 470 pages, illustrated. Price $6.

Significance of this book to engineers of a power persuasion is dual. First, an effort has been made to simplify the phenomena of ultra-high frequencies. Second, against the day when these frequencies may prove useful for relaying there should be a growing understanding of the principles involved as here set forth. In sequence the topics are oscillators (triode, transit-time, magnetron, resnatron, transmission networks, reception, pulsing (radar), reflection, wave guides and antenna arrays.

TECHNICAL LITERATURE

Steel Plates—Definitions, manufacturing practices, check analyses, mill practices, testing and heat treating are outlined in a book "Alloy Steel Plates." The publication is Section 7 of the Steel Products Manual and is available from American Iron and Steel Institute, 350 Fifth Ave, New York 1, N. Y.

Flexible Cords—"NEMA Standards for Single- and Multiple-Conductor Flexible Cords with Vulcanized Synthetic Insulation and Lead- or Mold-Cured Synthetic Jacket" cover sizes No. 18 to 10 AWG inclusive. Publication 47-124 is obtainable from National Electrical Manufacturers Association, 155 East 44th St, New York 17, N. Y., at 50 cents per copy.

Psychrometry—Three charts and tables on the thermodynamic properties of air and steam are included in "ASRE Brochure on Psychrometry," reprinted from the 1948 Sixth Edition Basic Volume of the Refrigerating Data Book. The booklet may be obtained for $1 each from American Society of Refrigerating Engineers, 40 West 40th St, New York 18, N. Y.

Two-Dimensional Problems—An extension of numerical methods for handling partial differential equations in two dimensions is presented in "Numerical Solution of Axisymmetrical Problems, with Applications to Electrostatics and Torsion." The Bulletin 128 is made available, price 30 cents, by Engineering Experiment Station, The Ohio State University, Columbus 10, Ohio.

Overfire Jets—"Application of Overfire Jets to Prevent Smoke from Stationary Plants" can serve as a guide for commercial and industrial plants. Copy of the Technical Report VII may be obtained, price 25 cents, from the Technical Information Service, Bituminous Coal Research, Inc, 912 Oliver Building, Pittsburgh 22, Pa.

Conduit Fittings—"NEMA Standards for Conduit Fittings, Cable Fittings and Accessories" are intended to cover fittings and accessories for rigid conduit, flexible metallic conduit, electrical metallic conduit, service entrance cable, armored cable and nonmetallic sheathed cable. Publication 47-125 can be obtained from National Electrical Manufacturers Association, 155 East 44th St, New York 17, N. Y., at 50 cents per copy.

Copper and Alloys—The 1947 edition of the compilation of ASTM Standards on Copper and Copper Alloys aggregates 480 pages. Included are cast and wrought materials, electrical conductors, and nonferrous metals used in copper alloys. Copies may be procured, price $4, from American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa.

Adhesives—First compilation of physical tests and definitions relating to adhesives is a 48-page booklet including twelve standards. "ASTM Standards for Adhesives" can be obtained at $1.25 each from American Society for Testing Materials, 1916 Race St, Philadelphia, Pa.

Coupling Capacitors—Information concerning rating, testing, performance and manufacturing are included in "Standards for Coupling Capacitors and Potential Devices." The publication 47-123 is available from National Electrical Manufacturers Association, 155 East 44th St, New York 17, N. Y. at $1 per copy.

Fixture Selector—A "Fluorescent Fixture Selector has been developed to estimate the number of lighting fixtures needed for desired maintained foot-candles in any given area. The slide rule device is made available by Mitchell Manufacturing Co, 2525 Clybourn Ave, Chicago 14, Ill.

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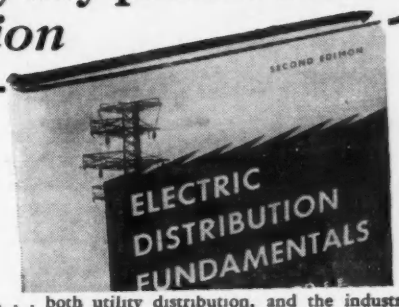

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